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ABSTRACT

This document is a report of the Early Childhood Intervention Programs (ECIPs) in Saskatchewan (Canada), covering 1984 to 1990. The report describes: the ECIP approach to early intervention; the children who are enrolled in the ECIPs; children's levels of development when entering and leaving the ECIP; changes in rates of development while in intervention; and conclusions and implications. Disabilities included developmental delay, speech and language delay, cerebral palsy and other neuromotor disorders, Down syndrome, and at risk due to environmental factors. The ECIPs provide home-based intervention using a developmental plan with parents and children. Over the intervention period, children in most categories showed a pattern of initial marked positive change in rate of development, with a gradual tapering off. The less disabled children tended to move on to other programs while the more seriously disabled remained for 30 or more months of intervention with the ECIPs. Positive changes in rates of development were seen for all but one group of children (the Down Syndrome children). Appendices contain a reprint of a paper by Mark Wolery titled "Proportional Change Index: An Alternative for Comparing Child Change Data" as well as 28 figures and 27 tables showing developmental data about the 788 children in the study. (Contains 10 references.) (JDD)

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A Descriptive Study of Early Childhood Intervention Programs in Saskatchewan: Final Report of "The Alpern-Boll" Data 1984-1990

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Research is never the work of any one individual. This is especially true in the case of research about our Saskatchewan ECIP children. Each report of the progress of the children enrolled in these programs has resulted from a very large human commitment in the face of a very small budget.

I would like therefore, to acknowledge and to thank many people most of whom will not be named. By far, the most important contribution (apart from labours of the parents and children) comes from the ECIP workers who have done virtually all of the gathering of data for this study; and from the ECIP directors who have diligently sent summaries of the data to my office, over a time period of up to six years. Coders of data, as well, have made a major contribution to this project. Ms. Sheila Flory of the computing services staff, University of Saskatchewan, and her students have helped me to "communicate" with the computer, over the years, with a minimum of stress. Mr. Archie La Rocque of the Department of Social Services (Community Living Division) and Ms. Carol Glazer of the Saskatchewan Association for Community Living have shared ideas and information, and have given me much appreciated support. As well, Ms. Glazer has been the principal "communicator" between the ECIPs and myself. Her efforts have been critical to the project. Their respective agencies, the Department of Social Services (Community Living Division) and the Saskatchewan association for Community

Living have given much needed and much appreciated financial support both to the ECIPs and to this descriptive study. Lastly, the ECIP Council and each ECIP parent-community board has contributed by agreeing to take part in the study and to support staff time for meetings about this research and staff time for the gathering of data.

I wish to express my thanks to all of these people, for their work and for their support. I hope this network of people will continue in this endeavor for a number of years to come.

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INTRODUCTION

This document is a report of the Early Childhood Intervention Programs (ECIPs) in Saskatchewan and covers the years 1984 to 1990. The purpose of this report is six-fold:

1. to describe the ECIP approach to early intervention
2. to describe the children who are enroled in the ECIPs
3. to describe the children's levels of development at the point of entering the ECIP
4. to describe the children's levels of development at the point of leaving the ECIP
5. to describe any changes in rates of development while in intervention
6. to present conclusions and implications of the results of this descriptive study.

Background

The benefits of early intervention programs for preventing and/or minimizing the effects of disadvantagement, disability, and other handicapping conditions have been the object of considerable research since the mid-sixties. While the positive effects of early intervention are more clearly apparent for preventing or minimizing developmental problems associated with DISADVANTAGEMENT; the positive effects of early intervention for preventing or minimizing the developmental problems associated with DISABILITY are, nevertheless, worthy of serious

consideration. (For a complete discussion of these issues see B. Bloom, 1986).

Research pointing to the positive effects of early intervention for both disadvantaged and disabled preschoolers has been increasing in both quantity and quality in the last ten to fifteen years. It was within this ferment of a growing body of research literature pointing to the positive effects of early intervention that Saskatchewan officially began to provide intervention for preschoolers and their families, as a provincial service.

While there had been some early (developmental) intervention done in the province on an informal basis since the sixties, most early intervention had been primarily medical in nature up to the late sixties. In 1967 the Alvin Buckwold Centre (ABC) was established. Early in its history it provided home-based programs for families and consultative programming through its outreach services. An early intervention preschool was established at ABC in 1973 and an infant stimulation program was established in 1977.

By the late seventies (1976-1977) the Institute of Child Guidance and Development and the Department for the Education of Exceptional Children, both units within the University of Saskatchewan at that time, had established a preschool component within a large research and development project that they were implementing with several school divisions surrounding Saskatoon. This preschool component became known as the SEECC Preschool

Project. It operated for two years and provided a very systematic home-based program to disadvantaged and disabled infants and toddlers living in the school divisions of the research and development project (Bloom, 1978a; M^{c} Leod, Bloom, Sanche, et al., 1979).

Because of the positive effects of the interventions provided by both ABC and the SEECC Preschool Project, the Saskatchewan Association of the Mentally Retarded (SAMR), now known as the Saskatchewan Association for Community Living (SACL) and the Department of Social Services (Community Living Division) began developing the mechanisms for a provincial network of early intervention programs. The first parent/community ECIP was established in Prince Albert in 1980. There are now sixteen established ECIPs throughout the province:

1. Saskatoon (Alvin Buckwold Centre)
2. Prince Albert
3. Regina and region (Fort Qu'Appelle)
4. Parkland (Yorkton)
5. North East (Tisdale)
6. Battleford
7. Llyodminister
8. West Central (Kindersley)
9. South West (Swift Current)
10. South East (Carlyle)
11. Meadow Lake
12. Weyburn

13. South Central (Moose Jaw, Assiniboia)
14. Children North (La Ronge)
15. Prairie Hills (Outlook, Davidson, Elrose)
16. Ille-a-la-Crosse

Centers numbered 2-13 have contributed data for this descriptive research project. (For more information on the history of early intervention in Saskatchewan see B. Bloom, 1978; B. Bloom and C. Glazer, 1985; and ECIP, 1987).

Each ECIP is locally managed by a parent board. The one exception to this is the ECIP at the Alvin Buckwold Centre which has a parent advisory board; but is managed by the Director of the Centre. The network of ECIPs, through their parent boards, has established the ECIP Provincial Council made up of local board or management committee members, ECIP staff, and consultants from various ECIP areas. The ECIP Provincial Council is a standing committee of the SACL. Funding for ECIP services comes from the Department of Social Services. This report, therefore, is being prepared for the ECIP Provincial Council, the SACL, and for the Department of Social Services (Community Living Division).

ECIP Programming

While there is individual variation among the ECIPs, all are designed to provide systematic home-based (developmental) intervention by working with parents and children who present some indication of developmental delay. All ECIPs have an open

referral policy. Anyone can refer a child to an ECIP for evaluation and possible intervention. Most referrals come from professionals such as doctors, nurses, school personnel, social workers and psychologists. Parents, however, are free to refer any child and many referrals have come from parents. Upon referral, a child is assessed using (among other things) an instrument which measures a child's level of development in several developmental areas. If a child is regarded as "developmentally delayed" (e.g. more than one standard deviation below what would be expected for a child of his/her chronological age) in one or more areas of development, the child could be offered a place in the local ECIP. For those parents who accept the offer of an ECIP "placement" for their child, there begins what will, hopefully, become a parent-professional partnership directed toward enhancing the development of the developmentally delayed child.

ECIP home-based intervention consists of regularly scheduled meetings of the parent and an ECIP worker. The parent-professional "partnership" continues to meet every other week (or sometimes every week) in the child's home. A developmental plan, based on the information from the developmental assessment instrument, parents' goals and objectives, and information from other professionals is written as soon as a child enters an ECIP. The plan is stated clearly in concrete steps which are sequentially ordered. The plan is implemented through educational activities. The ECIP staff worker models the

activities (if necessary) and the parent (usually, though not exclusively, the mother) carries out the intervention plan. The plan changes as the child progresses and as new needs for the child and family are defined. Continuous assessment is carried out through the weekly sessions and through regular re-assessment with the developmental instrument.

The Developmental Instrument

For this current study, the developmental instrument used was the Developmental Profile II (Alpern, Boll and Scherer, 1980). It is commonly referred to as the "Alpern Boll" and is designated in this study as ABS II. This instrument measures children's development in five different areas:

1. physical
2. self-help
3. social
4. academic
5. communication

Information is gathered through a parent interview or (as was often the case in this study) by creating the necessary situation for observing the child's performance of a specific activity or skill. A developmental score is calculated in each measurement area. These scores become the "developmental profile" out of which is created the individual intervention (the educational plan) presented to the child. For this study, the

scores from the five developmental areas were averaged as a measure of "general development" for each child.

The assessment scores from the assessment done as the child enters the program, is termed the "baseline" assessment. Each child is re-assessed on the ABS II approximately every six months. Subsequent assessments are termed "second assessment", "third assessment"' etc., up to "sixth assessment". Most children were in their programs only long enough to receive three assessments.

Children leave the program for various reasons. Sometimes they move, or enter a daycare program or go to kindergarten. Often they leave because of improved skills and competence. In this study, children are grouped by the number of assessments they have received ("two or more", "three or more", "four or more", etc.). Because assessments are done approximately every six months, grouping by number of assessments gives an indication of the length of time each group of children has been in intervention at each specific assessment. (e.g. At the point of the third assessment, the children grouped "three or more" have been in intervention for about 12 months; first assessment/ baseline, second assessment six months later, and third assessment six months after that).

THIS STUDY

For this study, ECIP workers at each ECIP centre completed data questionnaires for each child. These data questionnaires requested the following information:

1. ECIP centre's code
2. child's code
3. child's gender
4. birthdate
5. primary disability
6. significant additional disabilities
7. date child entered program
8. whether or not child is still enroled in the program
9. If not, where is the child?
10. If child was not assessed with the ABS II, what instrument was used?
11. date(s) and scores of assessments.

An Indicator of Change in Rate of Development

Descriptive statistics will be presented on important aspects of the data generated from the questionnaires. In addition, an indicator of change in rate of development, the Proportional Change Index (PCI) will be employed to describe change in the rate of development of various groups of children while in intervention.

The PCI (Wolery, 1983) is an efficiency index which controls for children's initial developmental status. By controlling for this problematic difference in children enroled in early intervention, the PCI allows comparisons to be made across children of different developmental ages, different chronological ages, and different severity levels of disability. The PCI is illustrated by the following formula:

DG/TI ÷ DA(baseline)/CA(baseline)

DG is "developmental gain" (in months); TI is "time in intervention" (in months); DA is "developmental age" at "baseline" (in months); and CA is "chronological age" at "baseline" (in months).

The PCI compares children's rate of development at "baseline" to their rates of development at various points (each subsequent assessment) during the intervention.

> ... Children's progress is reported by a numerical statement of the relationship between the assumed pretest rate of development and the rate of development during intervention. ... The PCI score is not solely a measure of the actual number of months gained during the intervention... The PCI takes into account the number of months actually gained, the number of months in intervention, and the child's rate of development at the pretest date.... A one-to-one correspondence between developmental age and chronological age cannot be assumed. The PCI, which uses both measures, is reported in terms of months gained, which reduces the temptation to assume that a one-to-one correspondence exists.
>
> Wolery, 1983, p. 168, 169

(For a photocopy of Dr. Wolery's article, "Proportional Change Index: An Alternative for Comparing Child Change Data", see Appendix A.)

An Example

To help clarify the PCI, let us consider a hypothetical child who has entered one of our ECIPs. At entry, Mike is 36 months old. His baseline assessment indicates that, developmentally, Mike is functioning at about 27 months (.75 of his chronological age). When entering the ECIP, Mike is 9 months delayed in his development. After six months of intervention, Mike is assessed again. It is determined that at this second assessment, at 42 months chronological age (CA), Mike is functioning at about 35 months, developmental age (DA). This represents a gain of eight months (in six months time) since his baseline assessment. Note, however, that Mike continues to be delayed (seven months).

If Mike had continued to develop at his baseline rate of development (.75) he would have achieved a developmental age of only 31.5 months (.75 of 42 months = 31.5 months). After six months of intervention, however, Mike achieved a developmental age of 35 months, a gain of 3.5 months of development **BEYOND** what we could have expected from his previous developmental rate. Mike's PCI at the second assessment would look like this:

$$\begin{aligned} PCI &= DG/TI \div DA(baseline)/CA(baseline) \\ &= 8/6 \div .75 \\ &= 1.33 \div .75 \\ PCI &= 1.77 \end{aligned}$$

Mike's parents keep Mike in the ECIP program for another six months. At Mike's third assessment he achieves a developmental

age of 39 months and has attained a chronological age of 48 months. This represents a developmental gain of four months, in the six month period since his second assessment. While Mike has gained a total of 12 months development in the 12 months since he entered the program, Mike is still displaying a delay of nine months. If Mike had continued to develop at his baseline (entry) rate of development of .75, he would have achieved a developmental age of only 36 months (.75 of 48 months = 36 months). Instead, in the 12 months since his baseline assessment, Mike has achieved a developmental age of 39 months, and has gained 12 months of developmental age. Mike's PCI at this third assessment would look like this:

$$PCI = DG/TI \div DA(baseline)/CA(baseline)$$
$$= 12/12 \div .75$$
$$= 1 \div .75$$
$$PCI = 1.33$$

At the fourth assessment, Mike's CA was 54 months: DA was 42 months; developmental gain since his last assessment was 3 months; overall delay was 12 months; and PCI was 1.11. At the fifth assessment Mike's CA was 60 months; DA was 48 months; developmental gain since his last assessment was 6 months; overall delay was 12 months: PCI was 1.16. At the sixth assessment, Mike's CA was 66 months; DA was 53 months; developmental gain since his last assessment was 5 months; overall delay was 13 months; PCI was 1.15.

While Mike continues to show signs of developmental delay following a total of 30 months of intervention, he is proportionately less delayed than when he entered the ECIP program. Moreover, during the 30 months of intervention, Mike has achieved 26 months of developmental gain. Had he continued to gain at his baseline rate of development, Mike would have achieved only 22.5 months. Figure 1 (Appendix B) depicts the Proportional Change Indexes for Mike as compared to his baseline assessment developmental rate.

All Figures for this report can be found in Appendix B. All Tables can be found on Appendix C. Mike's baseline rate of development is .75 (indicated by a "star". The baseline developmental rate is regarded as a unit of one. The graph of Mike's performance begins at 1.0, and subsequent PCIs are plotted in comparison to it.

PROCEDURES

The procedures for this study are quite straightforward. Children were referred to the ECIPs and each child was given an initial assessment. The term "assessment" is used here, very broadly. ECIP staff assess the learning needs of children referred to them in multi-dimensional ways. Using a specific developmental assessment instrument is only one small part of the total assessment process. Nevertheless, each ECIP usually includes in the assessment information of each child, information obtained from a standardized instrument measuring levels of

children's development. Up to the fall of 1988, the instrument used to evaluate children's levels of development was the Developmental Profile II (ABS II) (Alpern, Boll and Scherer, 1980). For the children of this study, assessment information was also obtained from hospital-based services, regional professionals, and other professionals, if necessary. During the school year 1988-1989, the ECIPs began the process of changing to a different instrument intended to be used by all ECIPs by the fall of 1989.

This study is about the ECIP children during the period of time when the ABS II was used as the principal instrument for assessing children's learning strengths and needs in a standardized and systematic manner. Scores from these individual assessments are the data of this descriptive study. ECIP workers forwarded biographical information (without naming the children); initial assessment scores ("baseline"); and all subsequent assessment scores ("2nd assessment"; "3rd assessment" etc.) to this author.

It should be emphasized that this research is a group project. ECIP workers have been and continue to be the source of the information on which the research project is based, As such, the ECIP workers are the primary researchers in this endeavour. This author's contribution is merely to try to present the information in a manner which will allow it to be understood throughout the province.

THE ECIP CHILDREN

The ECIPs taking part in this study reported 788 children on their rolls, since the beginnings of assessments and interventions in the participating ECIPs. All of these children have received some type of initial (baseline) assessment. Most of the children (700) were assessed with the ABS II. Occasionally, a different assessment instrument was used, or no specific instrument was used, depending on the child's specific characteristics and needs.

In this study, one of our concerns is examining changes in rates of development in children during intervention. In order to do this, we need to examine the scores of children who have received more than one assessment, all with reference to the same assessment instrument. Of the 788 children seen by the ECIPs, 486 children have received two or more assessments, based on the ABS II. Having two or more assessments indicates that these children received intervention for at least six months (from baseline assessment to assessment 2).

Over the same time period, 302 children experienced only one assessment using the Developmental Profile II, or were assessed with a different instrument, or were assessed by means which did not include a specific assessment instrument. We do not know how long this group of children received intervention. For this descriptive research project, such children have been counted simply as having received at least one initial assessment, which may or may not have included the ABS II.

ECIP staff assess ECIP children at regular intervals of about six months. The longer a child stays in intervention, the greater the number of assessments he or she will experience. Children in this study, therefore, can be grouped by number of assessments each has received. We can group children as having "two or more", "three or more", "four or more", "five or more", and "six or more" assessments. A child in the "six or more" assessment group would also be in all other groups. Children in any group are also in every other group with fewer assessments. Table 1 presents a summary of the frequency counts of all children enroled in the participating ECIPs. (All Tables can be found in Appendix C).

While all children require some kind of developmental delay, or a risk for developmental delay, in order to be enroled in an ECIP; some children have disabilities that are defined more precisely than simply, "developmental delay". Whatever the reason for referral, upon entry into the ECIP program staff designate the primary reason for the child's admission. In some cases, additional significant disabilities are listed, as well. As we would expect, with a population of children younger than school age, the largest group of children categorized by disability, is "developmental delay". This is true whether categorized as "primary disability" or as "all articulated disabilities" (i.e. any mentioned disability, whether primary, secondary, or tertiary). There are, nevertheless, several other categories of disability which are worthy of note.

The largest groups of primary disabilities (in descending order) are "developmental delay"; "cerebral palsy and other neuromotor disorders"; "speech and language delay"; and "Down syndrome". The largest groups of all articulated disabilities (in descending order) are "developmental delay"; "speech and language delay"; "cerebral palsy and other neuromotor disorders"; "at risk, due to environmental factors"; and "Down syndrome". The fact that "speech and language delay" moves up the sequencing when we examine all articulated disabilities indicates that it is frequently mentioned as a secondary or tertiary disability. Similarly, the large number of secondary and tertiary indications of the risks associated with environmental factors, is shown by the movement of the "at risk, environmental" category into the five major categories of disabilities, when all articulated disabilities are counted. Tables 2, 3, and 4 provide frequency counts of the children in various disability groups. Tables 5, 6, and 7 summarize this information by participating ECIP centres. Tables 8-19 present the same information for each individual participating ECIP centre.

Because the developmental progress of the ECIP children is being investigated over time, assessment scores have been grouped by number of assessments. Consequently, the frequency of specific disability groupings in each assessment group is of interest. Tables 20-24 summarize this information.

The proportions of different disability groups over time is of interest as well. Figures 2 and 3 depict the proportions of

the five largest categories of disability of ECIP children through six assessments (30 months of intervention). In general, the proportions of the largest disability groups remained fairly stable over the five assessment groups. The proportion of children with "speech and language delay", however, decreased over time. Figure 3 indicates that about a third of the children with this type of disability tend to leave the ECIP programs after about 18 months of intervention. The remaining 2/3 stay in intervention for about 30 months. On the other hand, the proportion of "children with cerebral palsy and other neuromotor disabilities" and "other physical disabilities" tend to stay in intervention for longer periods of time. On closer inspection, however, the proportion of children with "cerebral palsy" decreased after the third assessment but the proportion of children with "other neuro-muscular disabilities" increased over the 30 months of intervention (see Figure 4). The proportion of children with Down syndrome increased over time indicating that these children also tend to stay in intervention longer.

Attrition is an important factor to consider in this study. Only a small portion of children stay in their ECIP programs for six or more assessments (approximately 30 months of intervention). Most ECIP children remain in their programs for only three assessments, representing approximately 12 months of intervention. Of the 788 children who received some type of initial assessment, 89% (700 children) were assessed on the ABS II. This means that 11% (88 children) of the total ECIP children

were initially assessed by means of some other instrument, or no instrument was used as all. Of the 700 children (Figure 5) whose initial assessment included the ABS II, 31% (214 children) left their ECIP programs before their second assess-ment; 54% (378 children) left before their third assessment; 73% (514 children) left before their fourth assessment; 83% (584 children) left before their fifth assessment; and 90% (632 children) left before their sixth assessment. This should not be viewed as a limitation or failure of the ECIPs. Rather, it is more likely that most of these children left their ECIP programs because they no longer needed the service, or were sufficiently "improved" to enter already existing integrated community services.

This attrition is also descriptive of the children who have remained in their ECIP programs and are the subjects of this descriptive study. The ECIP children in this study are being examined by using information about them which was gathered while they were being provided intervention services. They received the service because they needed the service. When they no longer needed the service, they left the ECIPs. Figure 5 depicts the attrition of children from the ECIP programs.

Information from the Department of Social Services (La Rocque, 1989) indicates that most ECIP children (41%) leave ECIP programs to enter school programs. The next most compelling reason for leaving is having moved outside of the ECIP area (19%).

Information from our data, limited to those children who have remained in intervention for at least six months, indicate that most children (46%) left to attend kindergarten. Additionally, 13% left to attend a developmental centre program; 9% moved out of town; 9% left to attend a preschool program; and 4% left to attend daycare. An additional 19% left for "other" reasons. These include parental dis-interest or "non-compliance", family problems, parental requests to leave, or other personal decisions. A few of the children who have entered ECIP programs have died.

DEVELOPMENTAL FACTORS

Developmental Delay and Rates of Development

All groups of children in this study displayed developmental delay. Both the mean baseline PCI scores and various ratios of group mean developmental ages (DA) divided by group mean chronological ages (CA) attest to group developmental delay. We know, as well, that individual children displayed developmental delay at least at the point of entry into their ECIP programs, since such delay is a criterion for admission to any ECIP program.

Table 25 summarizes several descriptive statistics related to developmental delay for ECIP children grouped by number of assessments. Notice that all the mean baseline units for comparison of PCIs are below 1.0 (.75, .73, .72, .72, .75). These indicate that every group was delayed at the point of entry

to their ECIP programs. Ratios of DA divided by CA (col. 7) are also below 1.0. These ratios indicate that these groups of ECIP children are delayed at entry and continue to be delayed (to a lesser degree) throughout their time in intervention. The same is true of the number of months of delay that these groups of children display (col 6). All groups are delayed at entry and all groups continue to be delayed throughout their time in intervention. Notice, however, that while the number of months of delay increases in absolute terms the amount of the delay decreases relative to the children's mean chronological ages. In other words, while the children remained delayed, the amount of their delay decreased for the time that they were in intervention.

Proportional Change Indexes (PCIs) and the ratio of developmental age (DA) divided by chronological age (CA) can also indicate rates of development. Baseline units for comparison of subsequent PCIs give us rates of development at the point of entry into the program and DA/CA ratios can give us rates of development at baseline and at any assessment point in the intervention programming. Group means of either of these measures can give us rates of development for groups.

Changes in Rates of Development

Mean baseline units for comparison of subsequent PCIs indicate the rate of development for any group of ECIP children at the point of entry into their ECIP programs. Subsequent PCIs

(mean PCI scores in sequential order following baseline) indicate rates of development at various assessment points during intervention as compared to the baseline. Table 25 indicates that all subsequent PCIs show rates of development of at least a factor of 1.0 (meaning 1.0 times their baseline PCI) ranging to a factor of 1.6 (meaning 1.6 times their baseline PCI). During intervention, therefore, all groups indicated a developmental rate of at least their baseline rate (two instances) or greater than their baseline rate (13 instances). Of the 13 instances greater than their baseline rate, almost half (6) indicate a developmental rate of 1.4 or more, which signals a gain of one month of development for every month of intervention for the group during that intervention period.

Notice that both of the 1.0 PCIs are located at the fourth assessments of groups "five or more" and "six or more". As well, the fourth assessment of group "four or more" is also very low (1.1). We know that by the fourth assessment 73% of the ECIP children have left their ECIP programs (see Figure 5). It is not unreasonable to propose that this 73% contains a high proportion of the most competent children. This notion is further supported by the PCIs of Table 25 which show that five out of the six PCIs at or above 1.4 appear in the second assessment of each group.

Similarly, all of the DA/CA ratios show increases up to the third assessment, except for the group having six or more assessments. From baseline to the second to the third assessment, rates of change are very positive. From the third

assessment to the fourth assessment to the fifth assessment to the sixth assessment, rates are less positive. This could be interpreted negatively if one failed to take into account the decreasing size of each assessment group and the information that 73% of the ECIP children had gone on to other things **BEFORE** they had an opportunity to experience a fourth assessment. Very likely, it is the more severely disabled children who remain in ECIP programs for a fourth, fifth, or sixth assessment.

Figures 6-11 give visual depiction of these developmental changes. The star indicates the baseline rate of development for each assessment group. The baseline developmental rate is regarded as a unit of one (hence the dotted line indicating 1.0) and subsequent PCIs are plotted in comparison to it.

Table 26 provides the same type of information as Table 25, but for selected disability groups. Data from all groups (combined) is presented, followed by data from the five largest groups of all articulated disabilities. Lastly, group 16 and 26 are presented separately in order to see if there are any differences between these two previously combined groups. Notice that in every case, these groups of children were delayed at entry to their ECIP programs. As well, in almost every case there is an increase in rate of development up to the fourth assessment, and a decline in rate after that, sometimes followed by another increase. Figures 12-18 depict the comparisons of mean PCIs to baseline for the selected disability groups listed in Table 26. Notice that of the five largest groups of all

articulated disabilities, only Down Syndrome falls below 1.0 at some assessment points. I believe that our Down syndrome group presents some unique characteristics which make it difficult to accurately see how their development is progressing while in intervention. Possible explanations for group differences as shown in Table 26 and Figures 12-18 are as follows:

A. "All Groups" ... Compatible with other early intervention monitoring and research, our total group shows a marked increase in rate of development during the initial "bloom" of intervention, with a gradual levelling off after 12-18 months of intervention. Notice, however, that at no time do the groups return to their entry level of development (Figure 16). All assessment groups maintained PCIs above 1.0 (1.6, 1.3, 1.1, 1.2, 1.2). This means that, while in intervention, these children developed at from 1.6 to 1.2 times their entry rate of development. Recall, that by the time the children received the fourth, fifth and sixth assessment, 73%, 83% and 90% of the children had already left the ECIPs. It is likely that the more able children left after 12 to 18 months of intervention and the children with more difficult developmental problems remained for 24 to 30 or more months of intervention.

B. "Developmental Delay" (codes 1 & 2 combined) ... Children forming this category are, of course, quite

varied in the developmental problems that they present. Almost a third of the study children from this category had left their ECIP before the third assessment. This group shows a marked increase in rate of development during the first six months of intervention. Their rates level off at the third, fourth, and fifth assessments, but show a marked positive increase at the sixth assessment. At no time do they revert to their entry level rates of development.

C. Speech/Language Delay (code 12) ... Study children in this category show the same pattern of initial marked positive change in rate of development with a gradual tapering off. While in intervention, they never reverted to their entry level rate of development. This group is remarkable, however, because children from this group who remained in intervention for approximately 30 months showed a very positive increase in their developmental rates during the last twelve months of intervention. By the fourth assessment the number of children remaining in this group is only 22% of the number at entry. It is likely that those children with mild speech/language delay left their ECIP programs after the second or third assessment. The children who remained, took longer to gain greater speech and language competence but

eventually made excellent improvement as indicated by their fourth and especially their fifth assessments. At no time did these children perform below their baseline rate of development.

D. "Cerebral Palsy/Neuromotor Disorders" (codes 16 and 26) ... Study children in this category present some interesting contrasts. The children with cerebral palsy entered their ECIPs with a very low baseline performance (.47) and the children with other types of neuromotor disorders entered with a somewhat higher baseline performance (.57), giving a combined baseline performance of .51 (Table 26). An examination of Figures 4, 14, 17, and 18, seems to indicate some interesting differences between these two groups. While the children with cerebral palsy is the larger group, virtually half of them left their ECIps by the third assessment. Those who remained, showed some later improvement in their rates of development; but only a small proportion of children (5%) with cerebral palsy remained for six or more assessments (30 or more months of intervention). Children with other neuromotor disorders, on the other hand, stayed in intervention longer and responded more positively during the first six months of intervention than did the children with cerebral palsy. At the fifth and sixth assessment, however, each group responded to

intervention in exactly, opposite ways (Figures 17 and 18), thereby cancelling each others gain when the two categories are combined. In the case of both groups, however, limits to their rates of developmental change are probably also influenced by the attrition of the more mildly disabled in each of their groups and the seriousness of the disabilities of those children who remained. These children performed above their baseline rate of development at every assessment except one. The children with cerebral palsy performed at .9 of the baseline performance for all children with cerebral palsy at their sixth assessment; and the children with other neuromotor disorders performed at .9 of the baseline for all children with other neuromotor disorders at their fifth assessment. Inasmuch as these fifth and sixth assessment children represent a small portion of their total groups and likely are the more severely disabled of their groups, .9 of baseline performance of each respective TOTAL group probably constitutes an improvement over each remnant's baseline performance.

E. "At Risk, Environmental" (code 15) ... Study children comprising this category entered their ECIPs with a very high level of performance (.80) and responded very well to their first six months of intervention (Figure 15). By the third assessment,

almost half of the children designated environmentally at risk had left their ECIPs. Those children who remained, showed a steady increase in rates of development, except for the 10% who remained for six or more assessments. At no time did these children perform below their baseline rate of development.

F. "Down syndrome" (code 8) ... Study children comprising this category entered their ECIPs with a very high rate of development (.83). At first glance, their performance statistics indicate a poor response to intervention (Figure 16). Notice that they are the only group which performed at or below their baseline level for four of the five assessments subsequent to their baseline assessment. Eighty-seven percent of all Down syndrome children, however, stayed in intervention for only six months and maintained a performance while in intervention, which was slightly higher (1.1) than their very high baseline performance. Seventy-five percent remained in intervention for 12 months to receive a third assessment and to show continuation of their very high baseline performance. Only 25% of the group remained for longer intervention and most of these children performed at .8 or .9 of their baseline performance. About 20% of the total Down syndrome group (about half of those staying for more than 12 months of intervention) stayed in intervention for six

assessments (30 months). These, likely, were the most seriously handicapped of the Down syndrome group and, in the end, performed at .5 of the baseline performance of the total group. As with other groups, the less handicapped of this group likely moved on to other programs and the more seriously handicapped remained for 30 or more months of intervention with the ECIPs.

Figures 19-27 depict changes in rates of development of groups of ECIP children. These figures compare the "actual" development of the group with the "projected" development of the group. A line indicating "normal" development is also presented. "Actual" development was determined by the ratio of DA/CA at the last assessment of each group. Using this ratio has its limitations. While the procedure "works" for children grouped by number of assessments, when it is used for children grouped by disability it gives undue "weight" to the performance of those children who remained for six or more assessments. As has been stated before, these children are likely to be the most seriously handicapped of our ECIP children. As well, they, and the Down syndrome children were the youngest children at entry; therefore their baseline assessments carry the highest risks of invalidity and lack of reliability.

"Projected" development was determined by the ratio of DA/CA at the group's point of entry into their ECIPs. This ratio has limitations resulting from possible inadequacies of the

assessment instrument and problems of the validity and reliability of test scores of very young children. Early scores carry a risk of indicating a higher level of performance than that which a child might actually be able to attain, five or ten years later. In other words the "projected development" lines of Figures 19-27 might be unrealistically optimistic about the children's future performance, especially if no intervention had occurred.

Nevertheless, except for the Down syndrome children, all groups provided data which indicated that their "actual" rates of development were more advanced than their "projected" rates of development. While in intervention, the children performed better than we had a right to expect, judging from their baseline assessments.

Decreasing sample size of groups presents problems in analysis of the data resulting from measurement of the group. Because this study is not an experimental study, no effort was made to control group sizes. This study is attempting simply to obtain a good picture of the children in the various ECIPs in Saskatchewan and of their development. Nevertheless, we have five groups in this study (those defined by number of assessments), whose samples are the same from baseline to the point of last assessment for each group. As well, because we are now reporting on children from all over the province, some of whom entered their ECIPs as early as 1984, we are beginning to accumulate large samples of children in each group. Even our

smallest group has 68 children in it. With these large numbers it is now becoming easier to describe the effects of intervention on our Saskatchewan ECIP children. Moreover, again because of our large samples, a description of the effects of early intervention on our ECIP children is becoming more reliable.

Table 27 gives additional information from which we can discern changes in rates of development of ECIP children grouped by number of assessments. The first column lists the increase in chronological age from baseline to last assessment. The second column lists the increase in developmental age from baseline to the last assessment for each group. Columns three and four give baseline information about each assessment group and column five gives us a rate of development from the ratio of change (increase) in developmental age over change (increase) in chronological age. As an example, we can see that the group who received two or more assessments had gained 5.57 months in developmental age in 6.62 months of intervention at their second assessment. This represents a rate of development of .841 compared to their baseline rate of development of .754.

Figure 26 is a very simple but very important depiction of these changes in rates of development. Each group shows a positive change in rate of development. Notice, especially, the change in rates of development for the "two or more". "three or more" and "six or more" assessment groups.

We know that most ECIP children leave their ECIP programs before the fourth assessment (Figure 5). This means that most

(73%) receive from 6-12 months of intervention and are assessed only two or three times. It appears (Figure 28) that staying for twelve months of intervention (three assessments) provides the best benefits for ECIP children. Certainly these are the children who made the most dramatic positive change in rates of development.

The children who stayed for six or more assessments (thirty months of more of intervention) also seemed to profit from their experiences quite dramatically. (Some children have disabilities that take longer to show positive change in the presence of intervention).

Lastly, all assessment groups showed positive change, a fact for which ECIP workers and parents of ECIP children should take considerable pride and satisfaction.

SUMMARY

This report has described the approach of the Early Childhood Intervention Programs (ECIPs) to developmental intervention with preschool children in the province of Saskatchewan. The focus of this study has been the ECIP children, even though early intervention, as practised in the ECIPs, is family-centered. This study has described the ECIP children on several variables: age, levels of development, and categories of delay and disability. It has described positive changes in rates of development for all but one group of children while they were enroled in their ECIP programs.

COMMENTS

Some may regard the developmental changes described here as undramatic. It would be unfortunate if the gains made by these children were discounted or overlooked in such a manner. It is important to state again that about 73% of the ECIP enrolees left their ECIP programs after only 12 months of intervention. It is very likely that a large proportion of these "early leavers" are the more mildly disabled or delayed children. With this in mind, it is all the more remarkable that groups of ECIP children show such consistent developmental gains beyond what we might have expected from their projected baseline rates of development.

Moreover, there is nothing to guarantee that the ECIP children's rates of development would have stayed at their baseline projections, had there been no intervention. Given the cumulative effects of disadvantagement, disability, and delay, it is very probable that, without intervention, the ECIP children's rates of development would have declined below their baseline projections. Instead, while in intervention, all but one of the groups of ECIP children achieved rates of development above their baseline projections.

It is important to continue monitoring the progress of ECIP children. We are already preparing for the next study by gathering and coding data at regular intervals, using the new assessment instrument selected by the ECIP Provincial Council. The next study will continue in much the same manner as the present study. Regular evaluation helps ECIP staff and other

interested persons to maintain attention on the children and their development; and, therefore, to maintain attention on the primary reason for the establishment of the ECIPs themselves.

Given the consistent results of the three descriptive reports on the Saskatchewan ECIPs to date; however, and given the consistent positive results of early intervention throughout North America (Bloom. 1986) this author thinks that questions about the efficacy of early intervention are no longer interesting.

Even the United States government agrees that the efficacy of early intervention is obvious. Through the passage of P. L. 99-457, a dramatic increase in funding is now being directed to disadvantaged, disabled, and delayed three to five year olds. As well, a new state grant program for handicapped infants and toddlers (ages birth to two years) has been established in order to provide early intervention services to very young children. These increased funding and support services to handicapped preschool children were to be in effect in every state by the 1990-91 school year (Ballard et al., 1987).

There are many new opportunities in the field of early intervention as we move into the nineties. These new opportunities are related not only to educational practice; but also to research questions. Early intervention is a given. The practice of early intervention is ubiquitous throughout North America. We need, now, to examine research questions having to do with how we will best meet the training needs of early

intervention workers; the impact of early intervention on policy issues like integration and community-based services; the impact of early intervention on families with young developmentally delayed children; and the impact of early intervention on educational systems.

Lastly, while I do not scoff at experimental research and large sample studies, nor do I scoff at descriptive studies which give us broad pictures of social phenomena; I believe it is time for researchers in psychology and education to take more seriously the techniques of qualitative research. With reference to the phenomenon of early intervention, we know that it works. Now we need to know more about the subtleties of early intervention and how it works. For this information we need to call on the tools of anthropology and some aspects of sociology and design qualitative studies which will give our knowledge base some finesse.

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Wolery, M. (1983). Proportional change index: An alternative for comparing child change data. Exceptional Children, 50, 2.

APPENDIX A

From "Proportional change index: An alternative for comparing child change data" by Mark Wolery, Exceptional Children 50, 2 pages 167-170. Copyright 1983 by the Council for Exceptional Children. Reprinted with permission.

Proportional Change Index: An Alternative for Comparing Child Change Data

MARK WOLERY

Abstract: In the past, efficiency indices have been proposed as a means of expressing child progress from developmental data. In the present article, a variation of a previous index is proposed and examples are shown depicting the utility of the proposed variation. The proposed variation, the Proportional Change Index (PCI), is a numerical statement of the relationship between children's rate of development during intervention with the rate of development at the time intervention began. It allows comparisons of program efficiency across children with varying severity levels of handicapping conditions, different chronological ages, and developmental abilities.

■ The amount and variety of early intervention services for young handicapped children have greatly increased since the initiation of the Handicapped Children's Early Education Program (HCEEP) in 1968. Evaluating the effectiveness and efficiency of early intervention programs in accelerating children's development, maximizing their independence, and facilitating positive parent-child interactions is a subject of considerable concern. This concern is illustrated by entire issues of both early childhood special education journals having been devoted to the topic of program evaluation (i.e., *Journal of the Division of Early Childhood*, Volume 4, 1982; *Topics in Early Childhood Special Education*, Volume 1(4), 1982). Further, authors of two recent reviews of the effectiveness of early intervention state that the evaluation studies are plagued with methodological difficulties (Dunst & Rheingrover, 1981; Simeonsson, Cooper, & Scheiner, 1982). Those difficulties include design problems (e.g., Sheehan & Keogh, 1982; White, 1980) and measurement problems (e.g., Garwood, 1982; Ramey, Campbell, & Wasik, 1982; Simeonsson, Huntington, & Short, 1982; Zigler & Balla, 1982).

One measurement problem is the presentation of the results from outcome variables in a manner that allows comparisons across individuals and groups of young handicapped children. To address this problem Simeonsson and Wiegerink (1975) proposed an efficiency index, which is illustrated by the following equation:

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$$\frac{\text{Actual Gain}}{\text{Ideal Gain}} = \frac{\text{MDI}^*}{100}$$

*Mental Development Index from the Bayley Scales of Infant Development, or some other measure of developmental status, such as McCarthy Scales of Children's Abilities.

Using this index, the efficiency of an intervention program could be compared across children of different ages, abilities, and handicapping conditions. Bagnato and Neisworth (1980) proposed another index called the Intervention Efficiency Index (IEI):

$$\text{IEI} = \frac{\text{Developmental Gain}}{\text{Time in Intervention}}$$

Unfortunately, as described by Simeonsson (1982), the IEI does not consider the "rate of progress as a function of the developmental status of individual handicapped children" (p. 358). Given that many, if not most, early intervention programs for handicapped children serve children with a variety of handicapping conditions and various levels of severity within each handicapping condition, the utility of the IEI is seriously limited. Perhaps the only situation in which its use can be justified is when all the children in the program are of one handicapping condition and are of the same severity level (e.g., moderately mentally handicapped children).

The purpose of this paper is to present a variation of the efficiency index proposed by Simeonsson and Wiegerink (1975). The proposed variation, called a Proportional Change Index (PCI), controls for children's initial developmental status (not controlled by Bagnato and Neisworth's IEI) and does so more precisely than using Mental Development Quotients or numerical values based on the American Association of Mental Deficiency classification system as described by Simeonsson (1982) and Simeonsson and Wiegerink (1975). The PCI can and should be used with measures from all developmental domains (motor, cognitive, communication, and social). The PCI is illustrated as follows:

$$\frac{\text{Developmental Gain}}{\text{Time in Intervention}} \div \frac{\text{Pretest Developmental Age}}{\text{Pretest Chronological Age}}$$

The PCI compares children's rate of development at pretesting to their rate of development during intervention. The rate of development at pretesting is calculated by dividing the child's developmental age by his or her chronological age. The rate of development during intervention is the same as Bagnato and Neisworth's (1980) IEI; that is, the amount of developmental gain (usually expressed in the number of months) is divided by the time in intervention (also expressed in the number of months). The amount of developmental gain is calculated by subtracting the pretest developmental age from the posttest developmental age. Hypothetical data are presented in Table 1 to illustrate the utility of a PCI. Based on these data, a number of observations are apparent.

First, children's progress is reported by a numerical statement of the relationship between the assumed pretest rate of development and the rate of development during intervention. Children who continue to develop during intervention as they did prior to intervention receive a PCI score of 1.0 (e.g., children number 1, 2, and 9). Likewise, children whose rates of development appear to be slower during as compared to prior to intervention receive a PCI score of less than 1.0 (e.g., child number 8); and children whose rates of development appear to accelerate during intervention receive a PCI score greater than 1.0 (e.g., children number 3, 4, 5, 6, and 7). These statements are true regardless of the severity of the child's delay, initial chronological age, initial developmental age, months in the program, actual developmental gain, and posttest developmental ages.

Second, the PCI score is not solely a measure of the actual number of months gained during intervention. For example, two children (or groups of children) who show the same number of actual months gained during intervention (e.g., children number 3 and 4) may have different PCI scores. Similarly, a child may gain fewer actual months than a peer, but have a higher PCI score (e.g., child number 7 as compared to children number 1, 3, 4, and 5). These statements are true because unlike the IEI, which considers only the number of months actually gained and the number of months in intervention, the PCI takes into account the number of months actually gained, the number of months in intervention, and the child's rate of development at the pretest date. Because pretest rates of development are considered in the calculation of the PCI, comparisons between children at various levels of delay,

TABLE 1
Hypothetical Data Illustrating the Proportional Change Index

Children	Extent of Delay	Pretest CA*	Pretest DA*	Pretest Rate of Development	Months in Intervention*	Actual Gain*	Posttest DA*	Developmental Rate During Intervention	Proportional Change Index
1	Not delayed	12	12	1	10	10	22	1	1.0
2	Not delayed	12	12	1	8	8	20	1	1.0
3	Not delayed	12	12	1	10	14	26	1.4	1.4
4	Mild delay	12	8	.67	10	14	22	1.4	2.1
5	Mild delay	21	14	.67	10	14	28	1.4	2.1
6	Mild delay	30	23	.77	4	5	28	1.25	1.6
7	Severe delay	12	4	.33	10	8	12	.8	2.4
8	Severe delay	12	4	.33	10	2	6	.2	.61
9	Severe delay	25	5	.20	10	2	7	.2	1.0

*Expressed in terms of months

chronological age, and developmental age can be made.

Third, as noted by others (e.g., Simeonsson, 1982; Simeonsson, Huntington, & Short, 1982), the concept of developmental age derived from developmental scales is not necessarily the same as the concept of chronological age. A one-to-one correspondence between developmental age and chronological age cannot be assumed. The PCI, which uses both measures, is reported as a relational statement about the change in a child's assumed rate of development. The relational statement compares the child's current level of performance to a previous level of performance. The scores are not reported in terms of months gained, which reduces the temptation to assume that a one-to-one correspondence exists.

At least two different uses exist for the PCI. It can be used to compare the progress of one group of children to the progress of another group of children. For example, comparisons can be made between groups of children receiving different intervention programs, two levels of the same intervention, or the same intervention with different types of children (e.g., different severity levels or different ages). When making group comparisons, the adequacy of the evaluation design is critical to the conclusions made from the evaluation study.

The second use of the PCI is to compare a child's progress to his previous progress. However, the PCI assumes that the pretest developmental age divided by the child's pretest chronological age is a reflection of the child's rate of development. This assumption may or may not be valid. Without doubt, children's rates of development may vary during the preschool years. Under some conditions, a child may develop slowly and then develop more quickly. Thus, if a pretest score was established just prior to a period when the child was going to develop more quickly, the PCI would be artificially inflated. The reverse, of course, could

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also be true. Ideally, a number of pretest scores taken over a period of months should be used in calculating the initial rate of development, but such opportunities rarely exist in the natural environment. This problem seriously limits the use of the PCI for individual children. When comparing groups of children, it may be assumed that the variations in the pretest rate would be equalized.

One note of caution concerning the PCI must be made. The value of the index is directly related to the reliability and validity (i.e., concurrent validity with actual development) of the tools used. This statement, of course, is true whenever developmental scales are used to evaluate intervention programs. An alternative to the use of developmental scales is goal attainment scaling (Simeonsson, Huntington, & Short, 1982). However, goal attainment scaling requires considerable time on the part of the evaluator, and requires some subjective judgments when determining the scale attainment levels.

In summary, the PCI is a variation of the efficiency index proposed by Simeonsson and Wiegerink (1975). It is a numerical statement of children's rate of development during intervention in relation to their pretest rate of development. It allows comparisons across children of different developmental ages, chronological ages, and severity levels and gives a foundation system for program evaluation.

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APPENDIX B

FIGURE 1
Proportional Change Indexes for Mike: Change in Rate of Development as Compared to Baseline (All Areas)

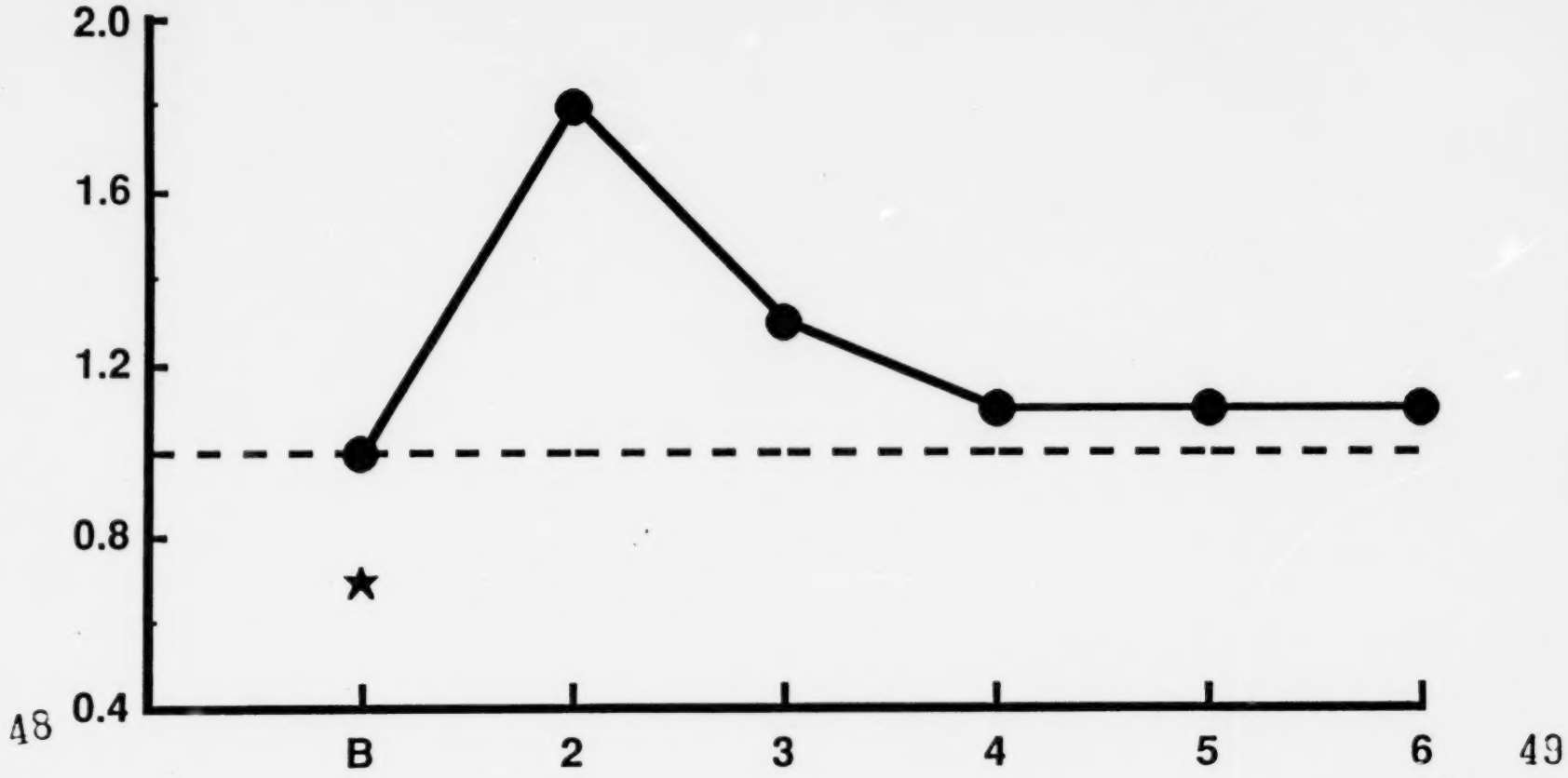
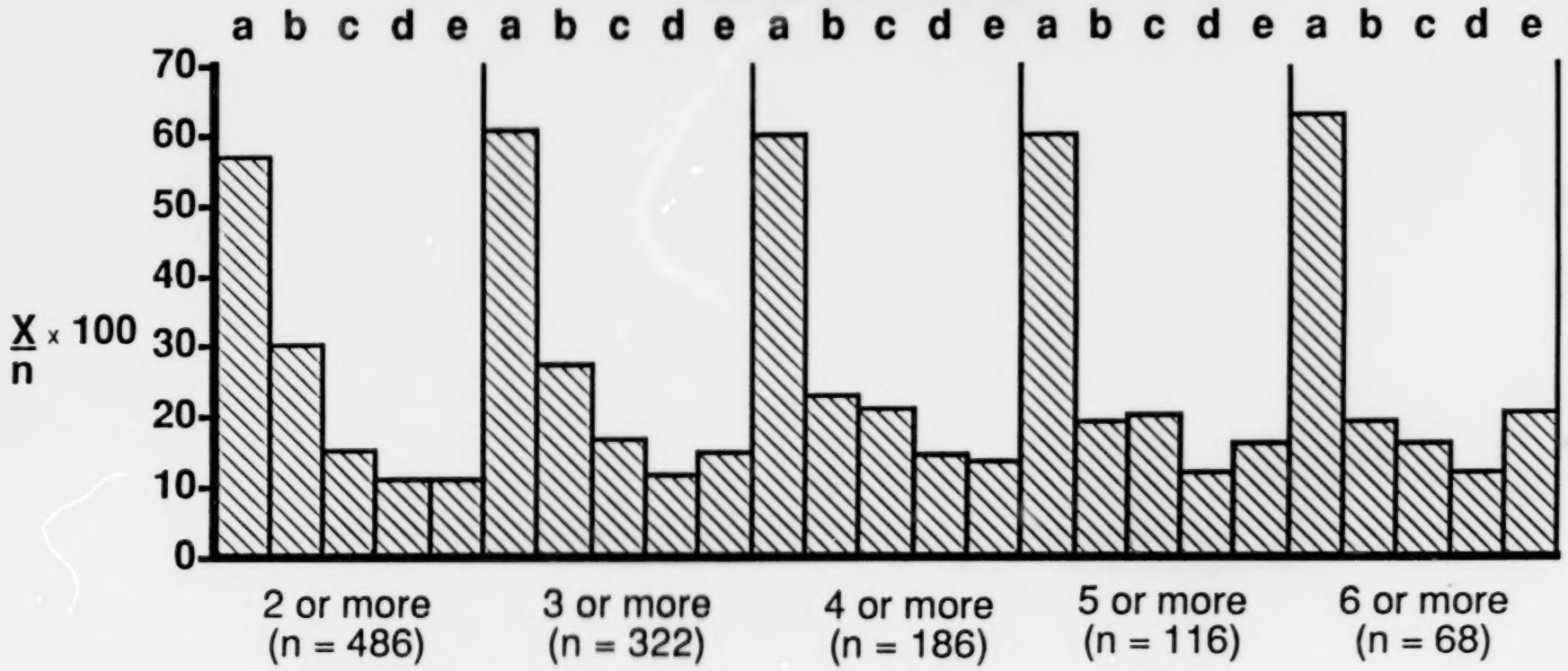


FIGURE 2
Proportions of Major Articulated Disability Groups by Assessment Groups

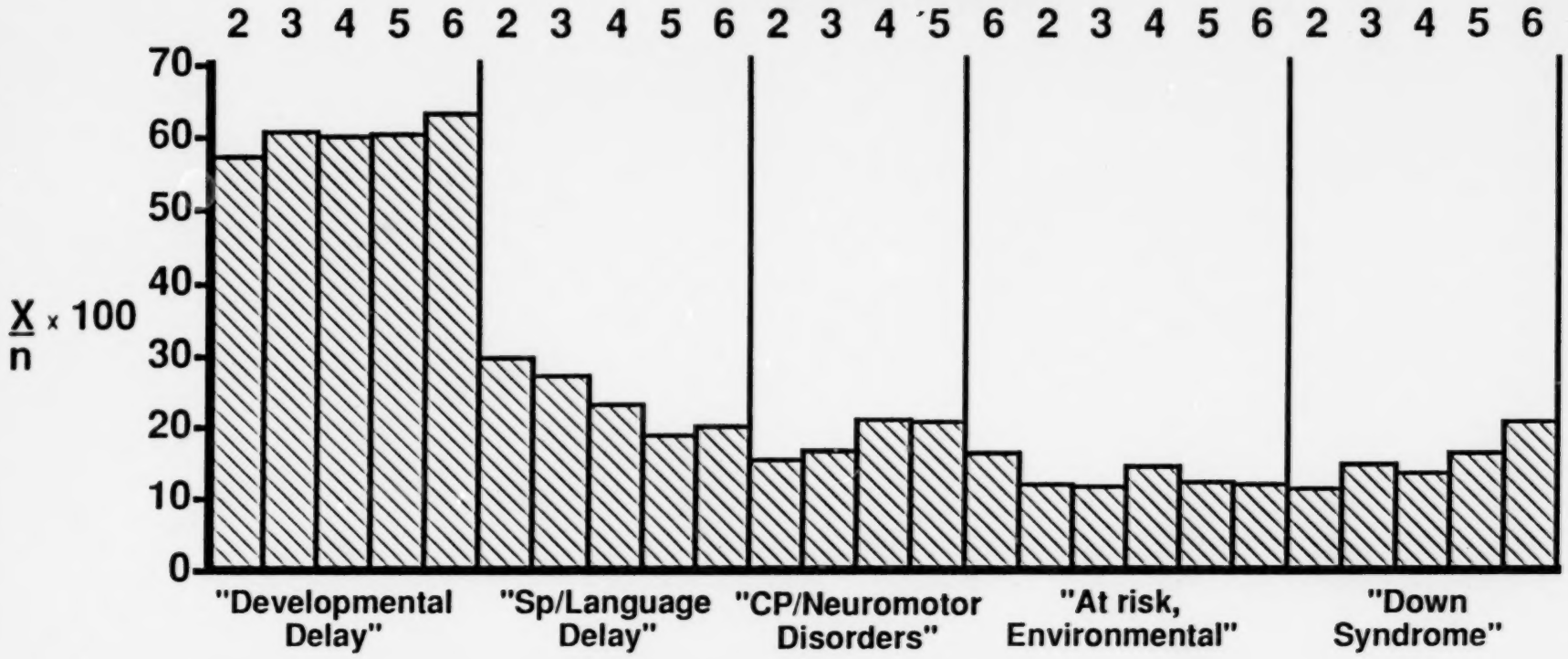

a b c d e a b c d e a b c d e a b c d e a b c d e
70
60
50
40
30
20
10
0
X/n x 100
2 or more (n = 486)
3 or more (n = 322)
4 or more (n = 186)
5 or more (n = 116)
6 or more (n = 68)

Disability Categories (from Table 2)

a. development delay
b. speech and language
c. CP/ neuromuscular disorders
d. at risk, environmental
e. Down syndrome

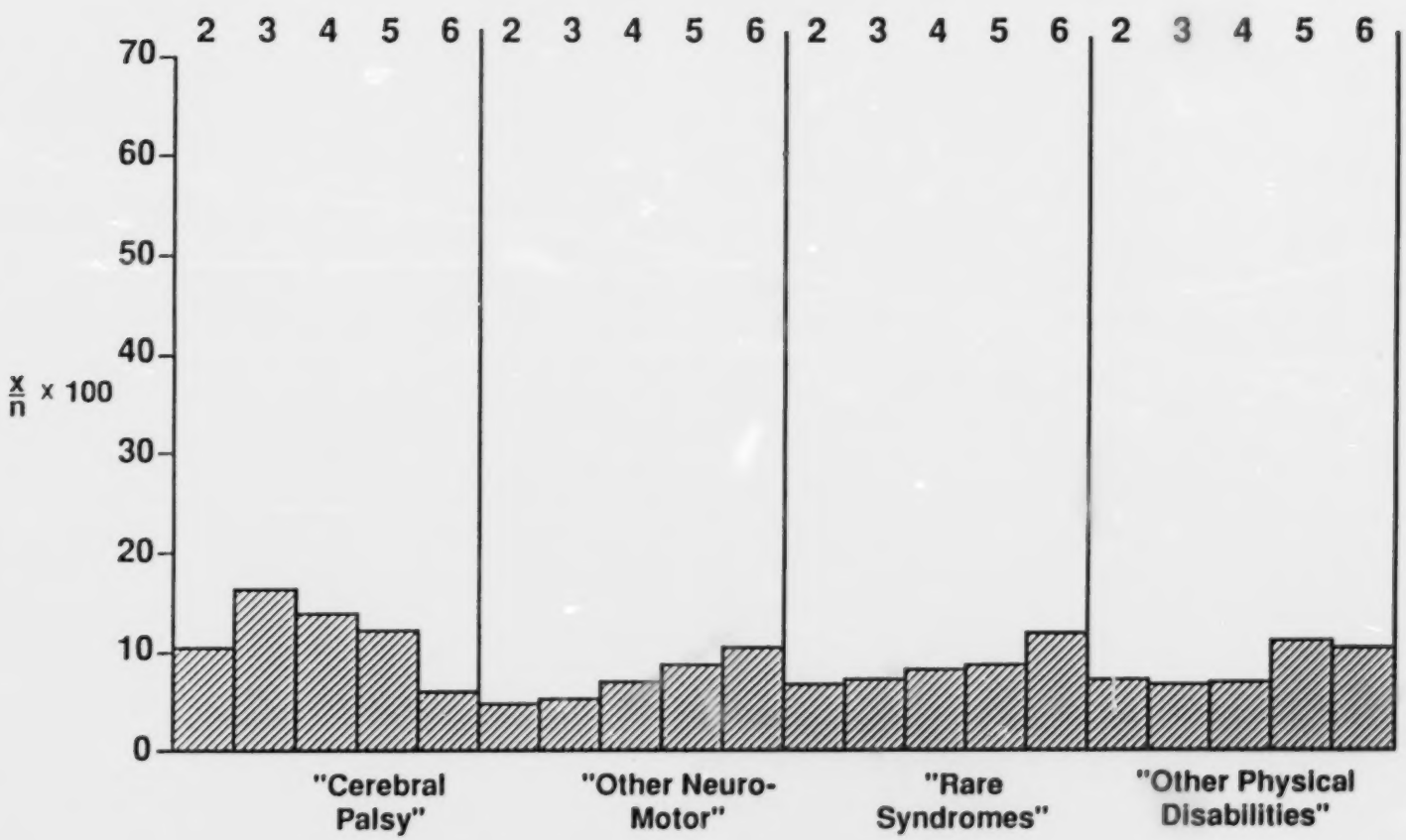
x=total by category by assessment group
n=number of subjects in each assessment group

FIGURE 3
Proportions of Major Articulated Disability Categories in Each Assessment Group



x = total by category by assessment group (from Table 2)
n = number of subjects in each assessment group (from Table 2)
2 = 2 or more assessments
3 = 3 or more assessments
4 = 4 or more assessments
5 = 5 or more assessments
6 = 6 or more assessments

FIGURE 4
Proportion of Two Additional Disability Categories by Each Assessment Group



X = total Ss by category by assessment group (Table 2)
N = total Ss in each assessment group (Table 2)
2 = 2 or more assessments
3 = 3 or more assessments
4 = 4 or more assessments
5 = 5 or more assessments
6 = 6 or more assessments

Figure 5
Proportions of Children Remaining in ECIP Programs at Each Assessment

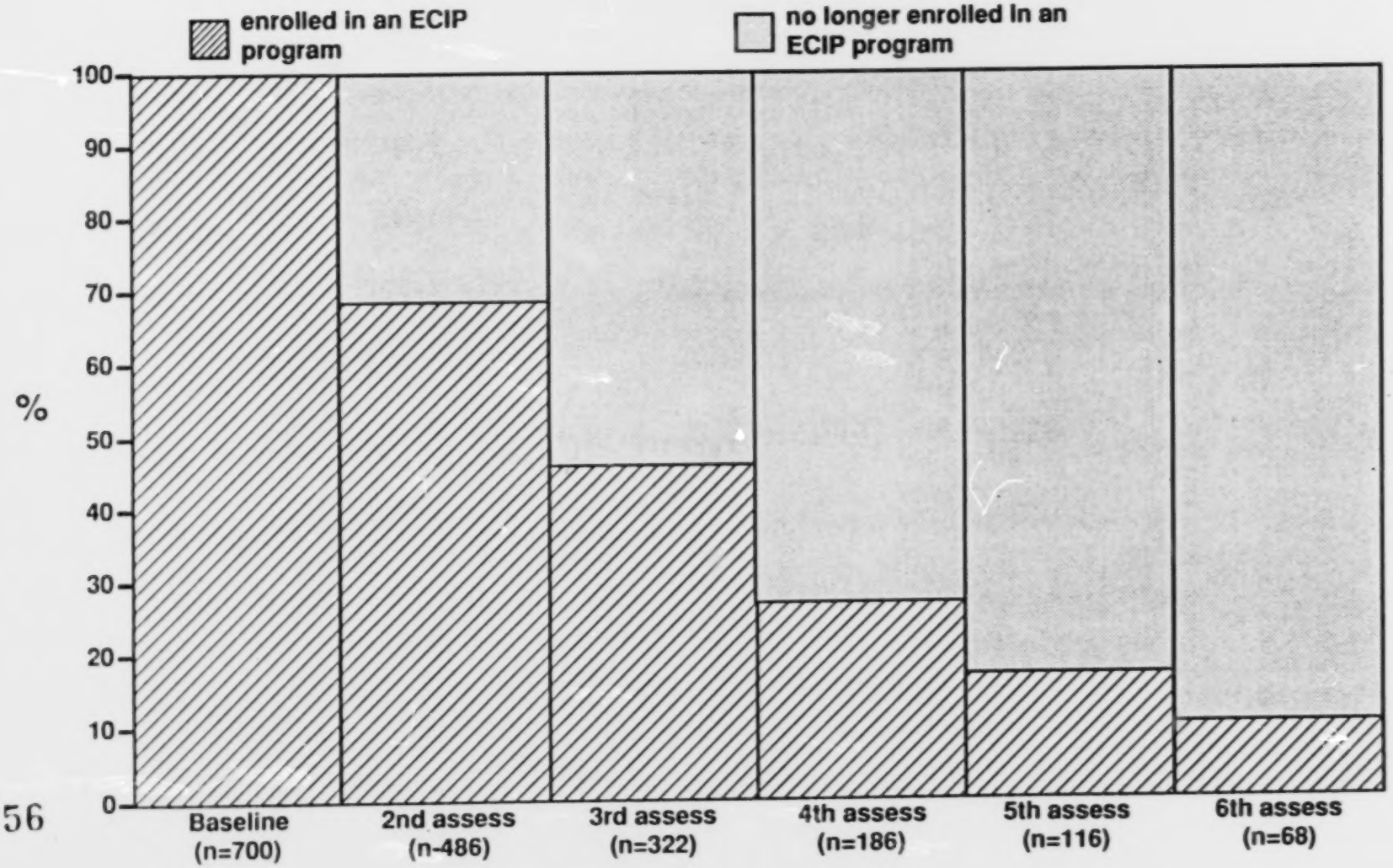


Figure 6
Mean Proportional Change Indexes (All Areas) as Compared to Baseline: All Groups (note changing n's)

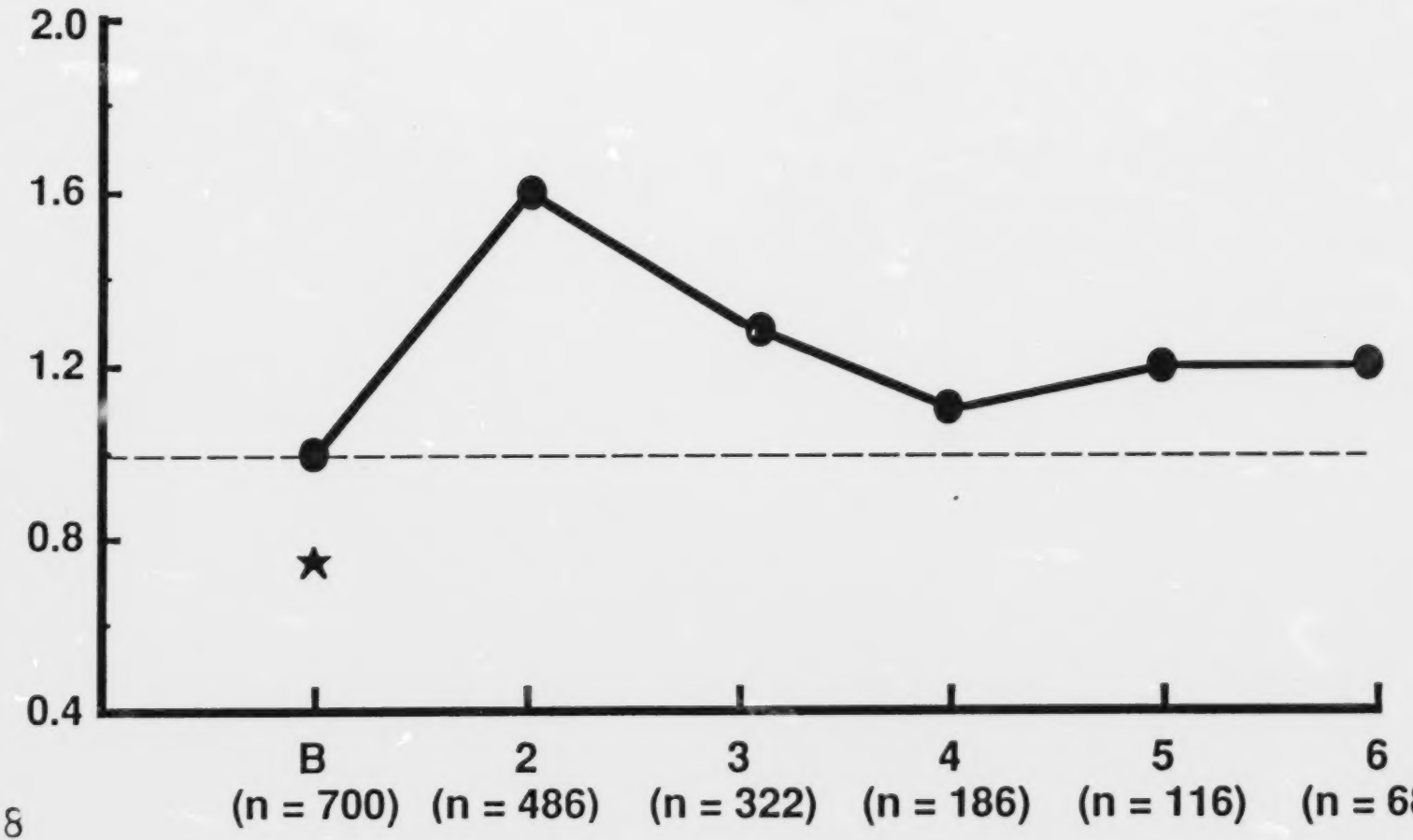


Figure 7
Mean Proportional Change Index as Compared to Baseline (All Areas): Two ore more Assessments (n = 486)

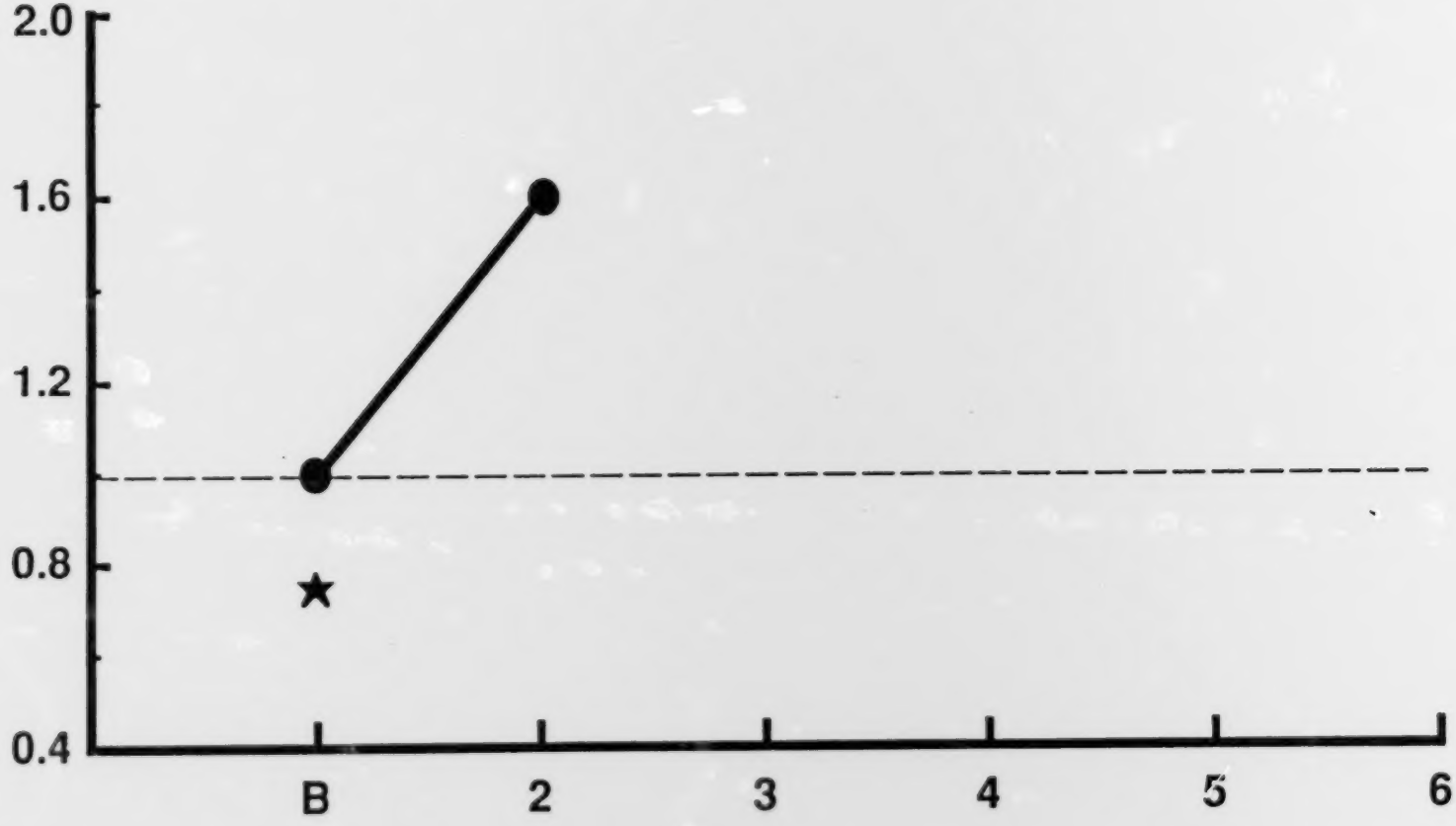


Figure 8
Mean Proportional Change Index as Compared to Baseline (All Areas): Three or more Assessments (n = 322)

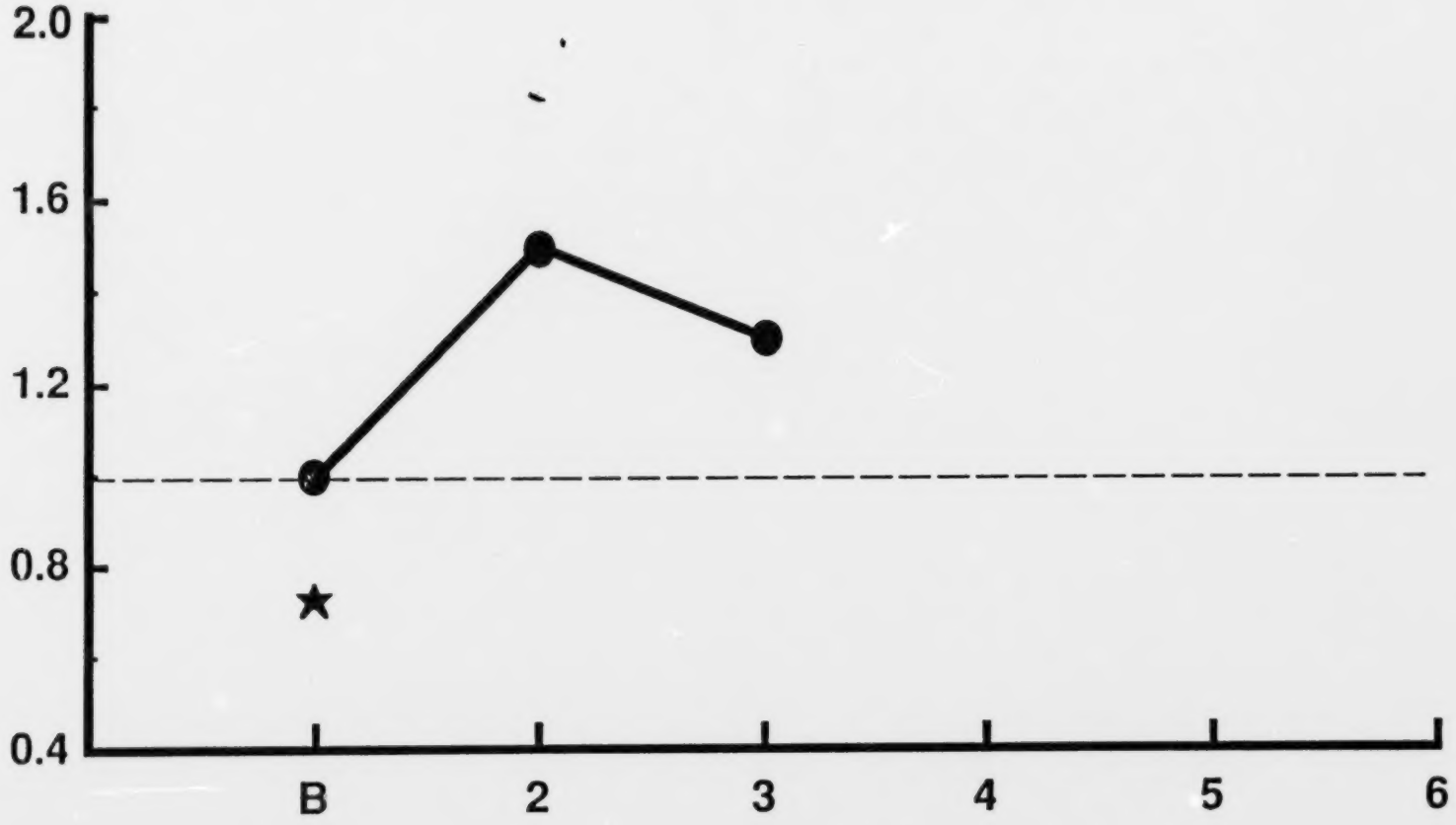


Figure 9
Mean Proportional Change Indexes as Compared to Baseline (All Areas): Four or More Assessments (n = 186)

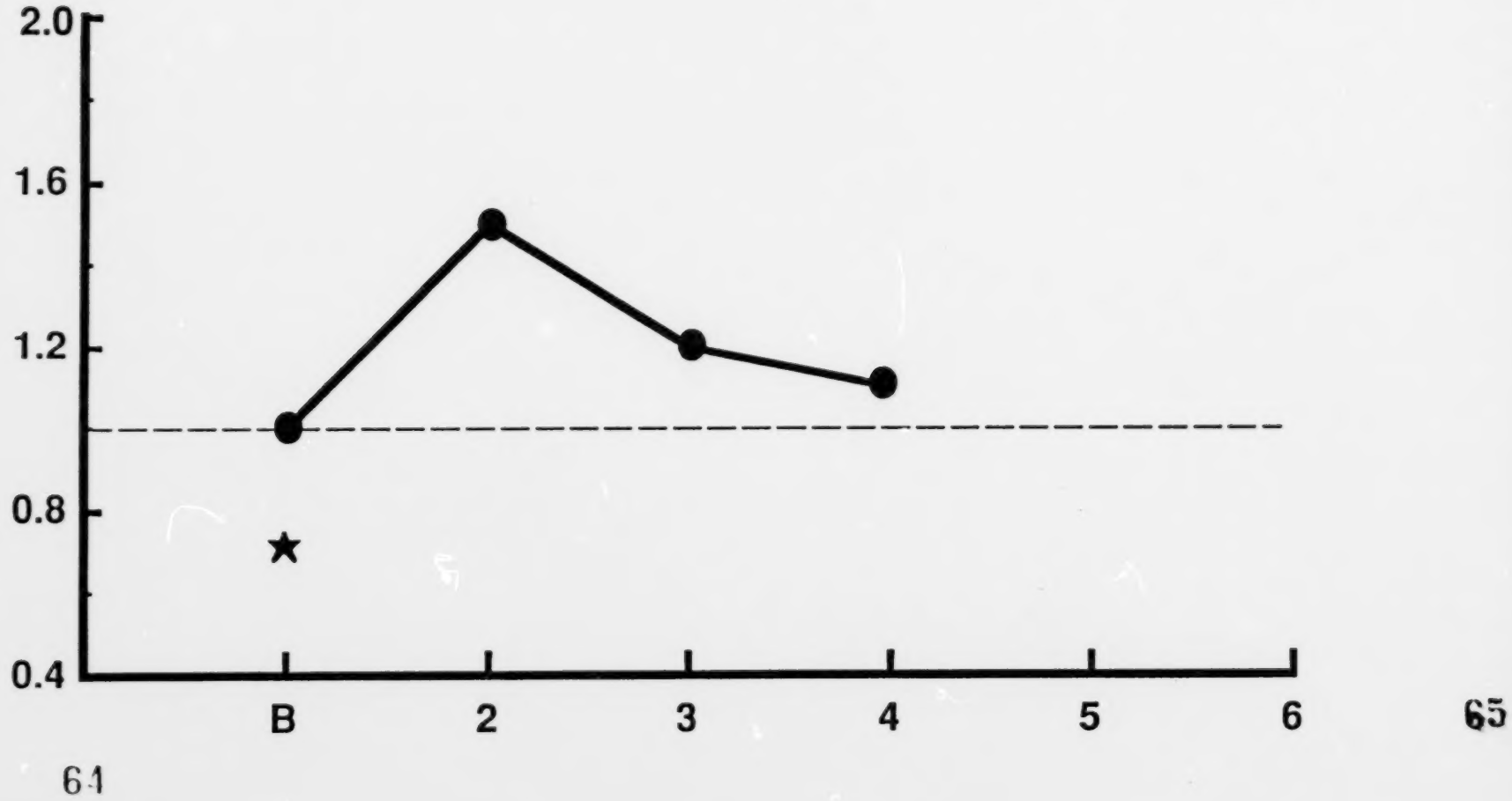


Figure 10
Mean Proportional Change Indexes as Compared to Baseline (All Areas): Five or More Assessments (n = 116)

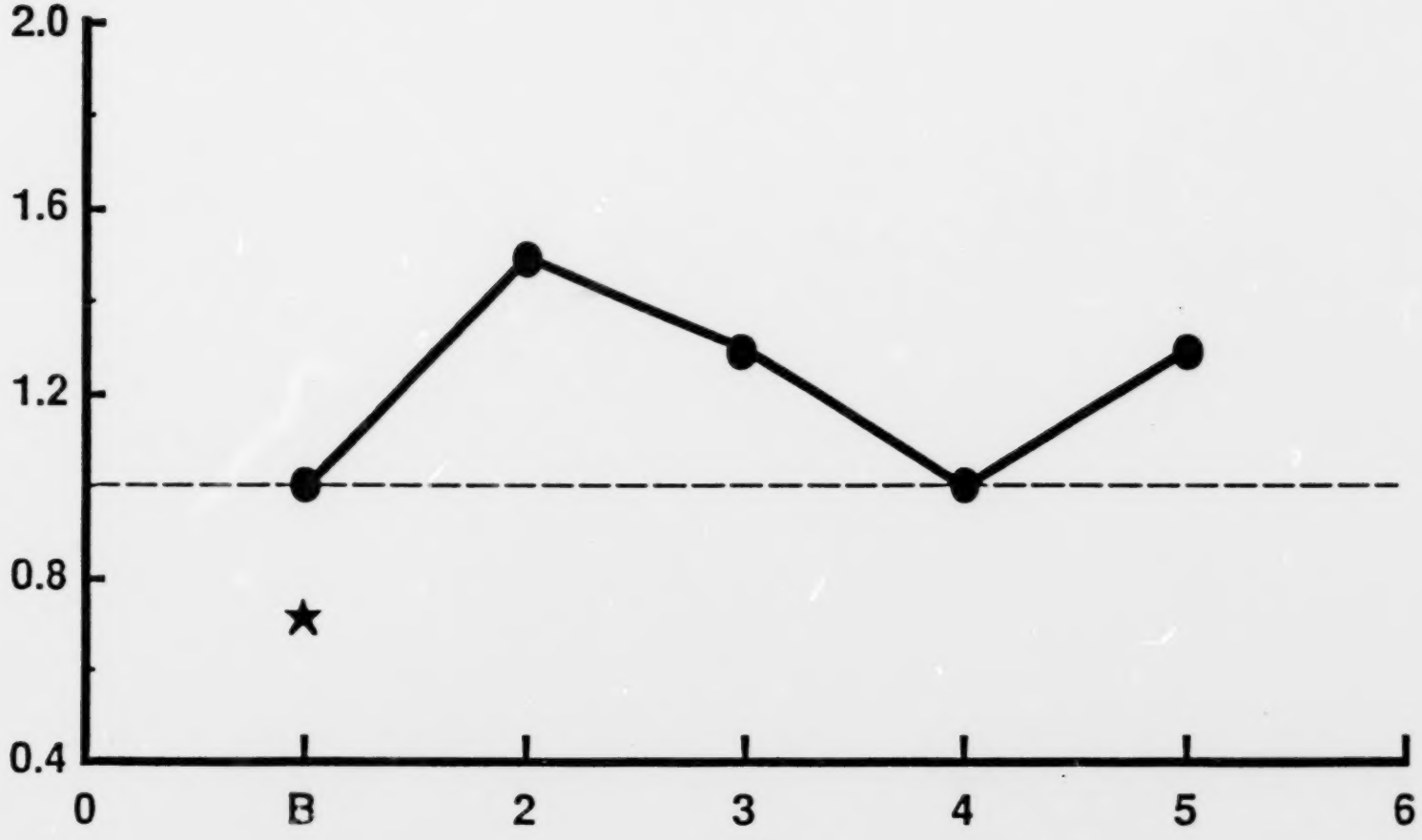


Figure 11
Mean Proportional Change Indexes as Compared to Baseline (All Areas): Six or More Assessments (n = 68)

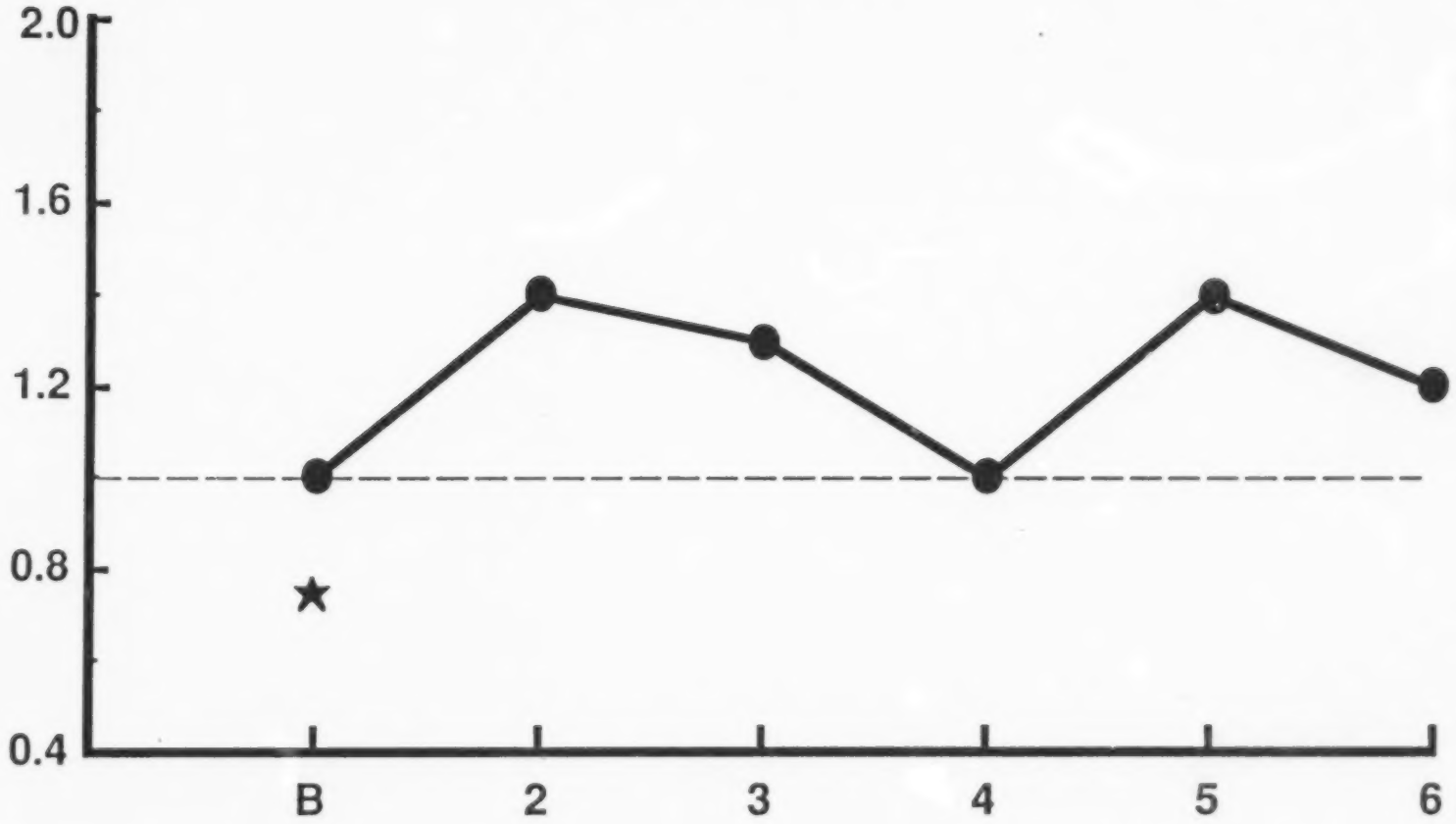


Figure 12
Mean Proportional Change Indexes as Compared to Baseline (All Areas): Code 1+2 "Developmental Delay" (note changing n's)

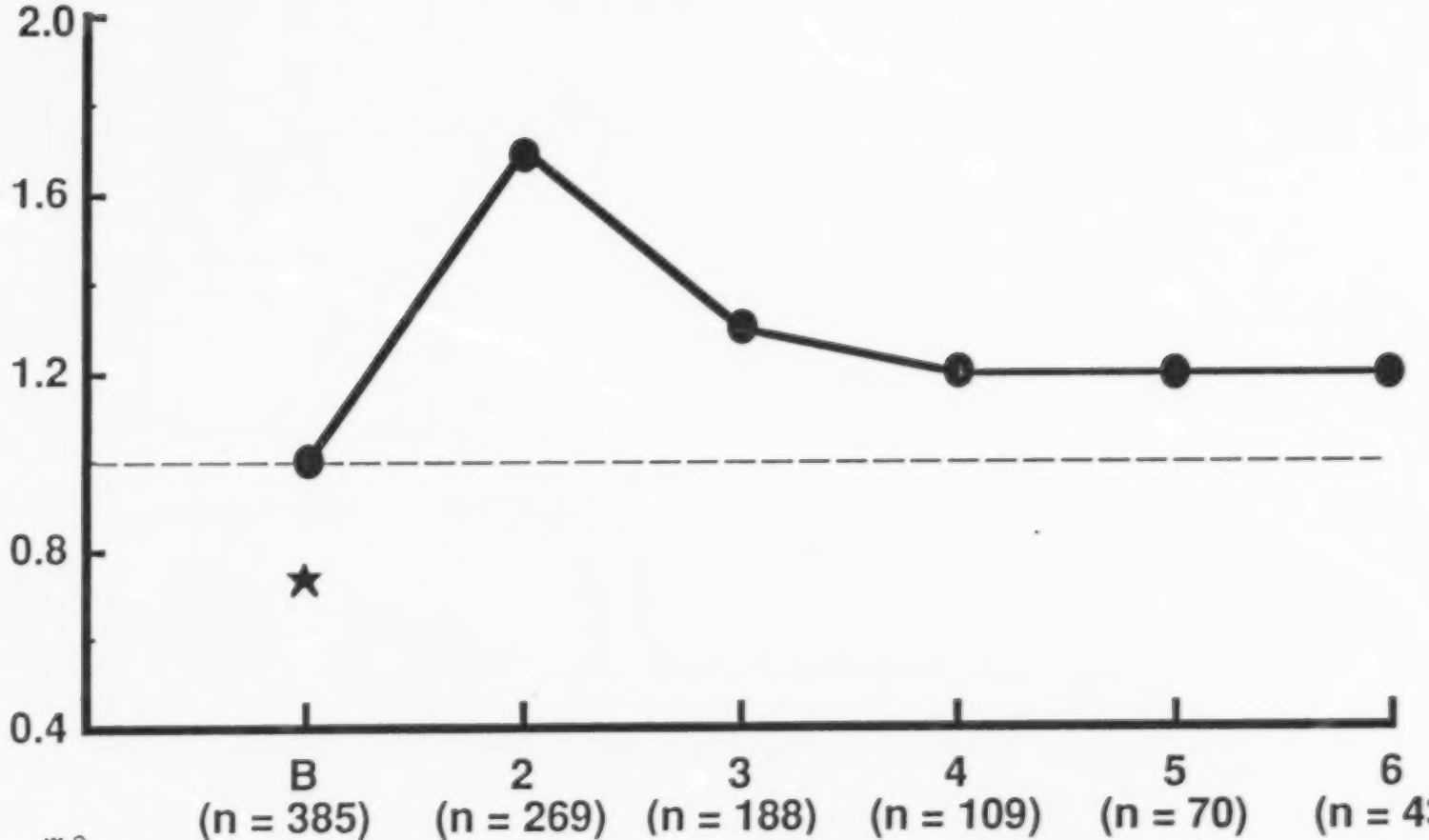


Figure 13
Mean Proportional Change Indexes as Compared to Baseline (All Areas): Code 12, "Speech/Language Delay" (note Changing n's)

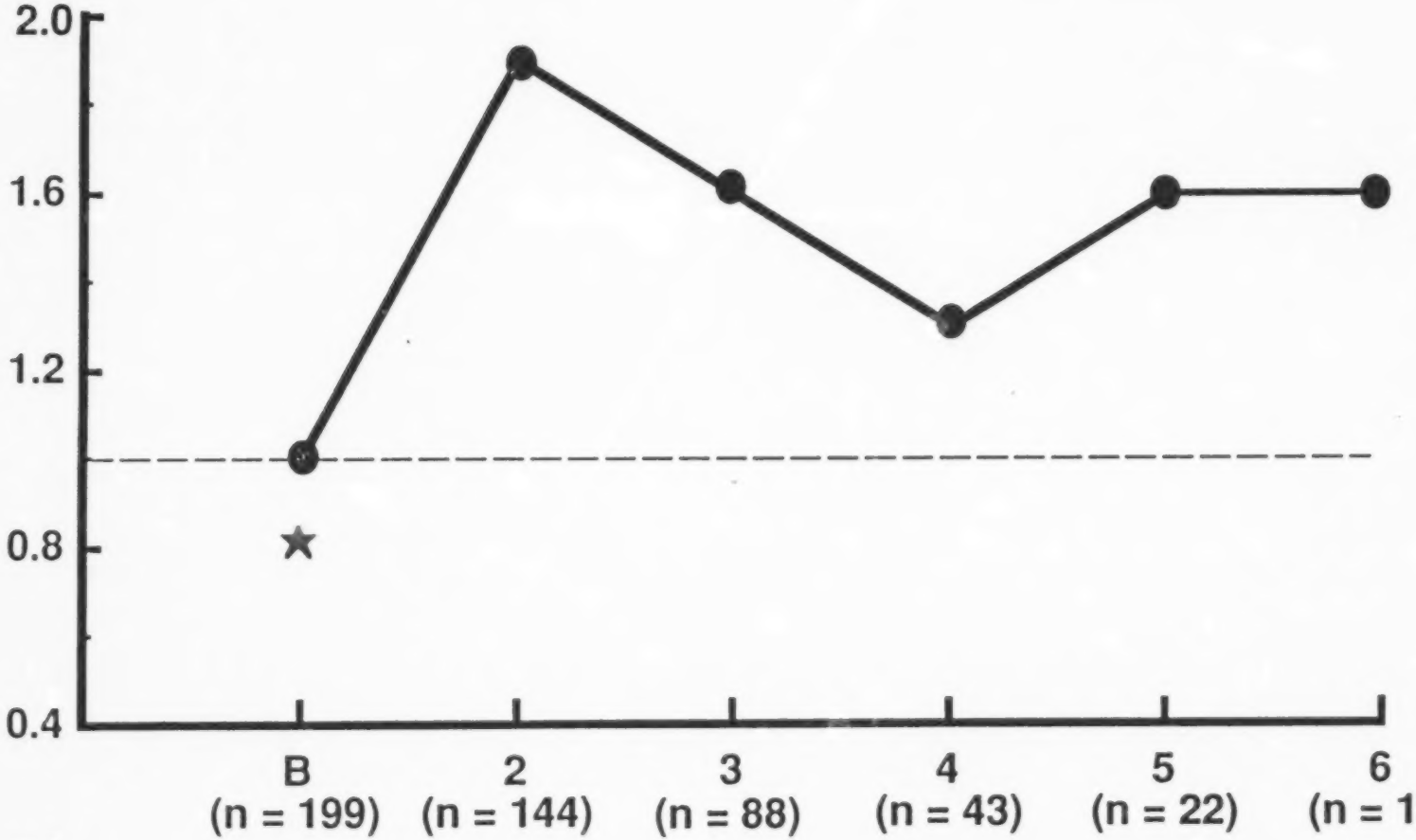


Figure 14
Mean Proportional Change Indexes as Compared to Baseline (All Areas): Code 16 + 26 Cerebral Palsy / Neuromotor Disorders (note changing n's)

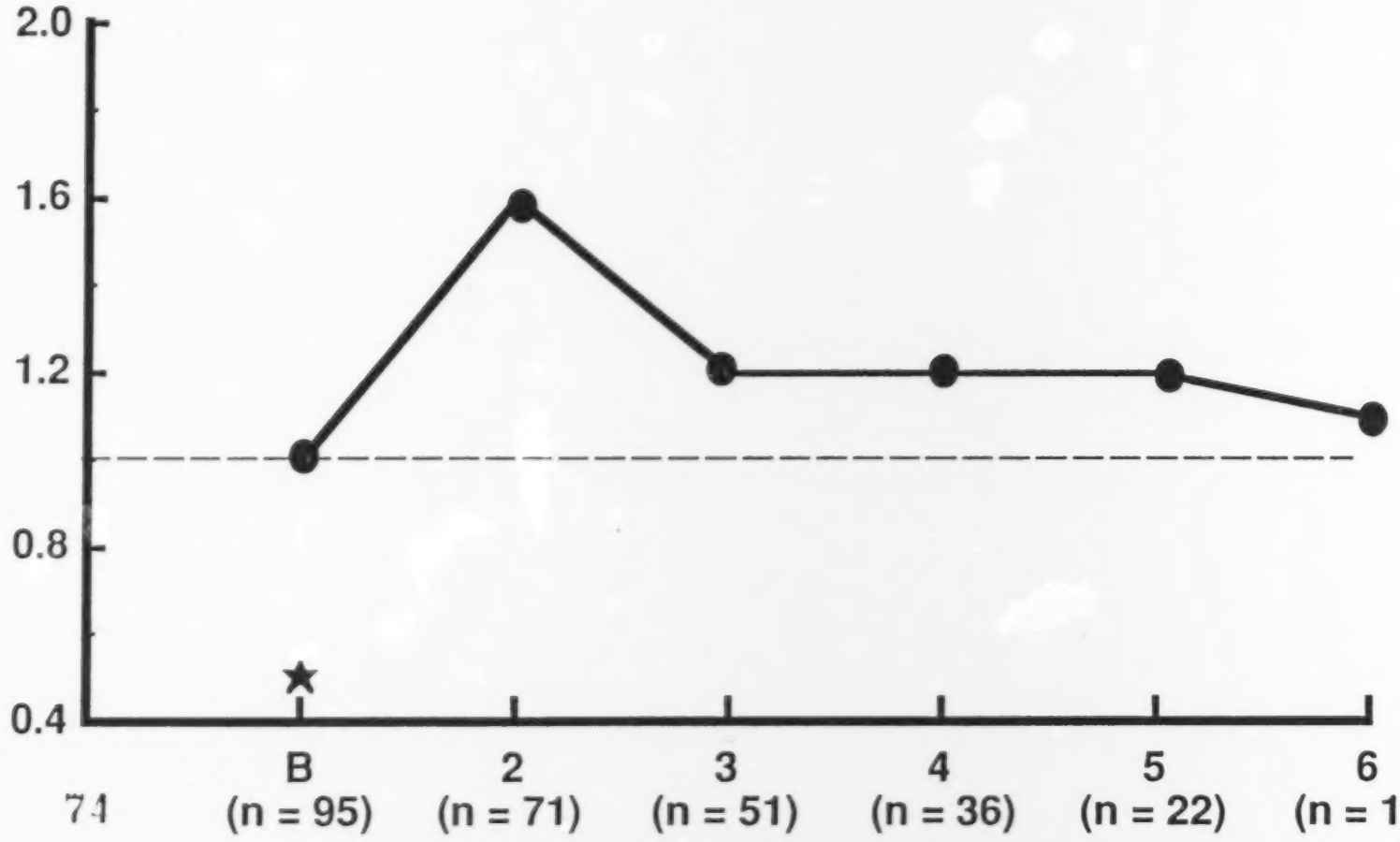


Figure 15
Mean Proportional Change Indexes as Compared to Baseline (All Areas): Code 4, "At Risk, Environmental" (note changing n's)

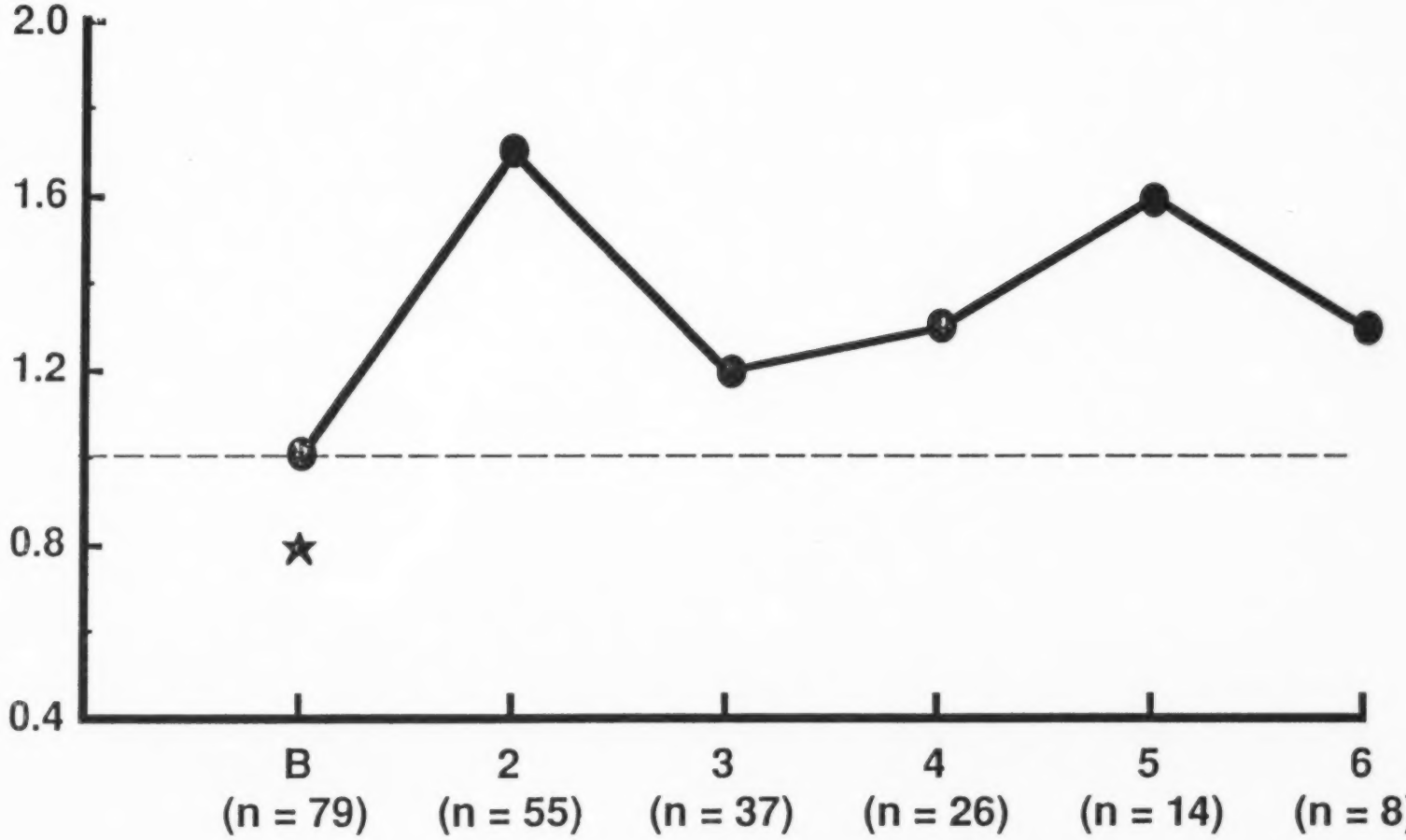


Figure 16
Mean Proportinal Change Indexes as Compared to Baseline (All Areas): Code 8, "Down Syndrome" (note changing n's)

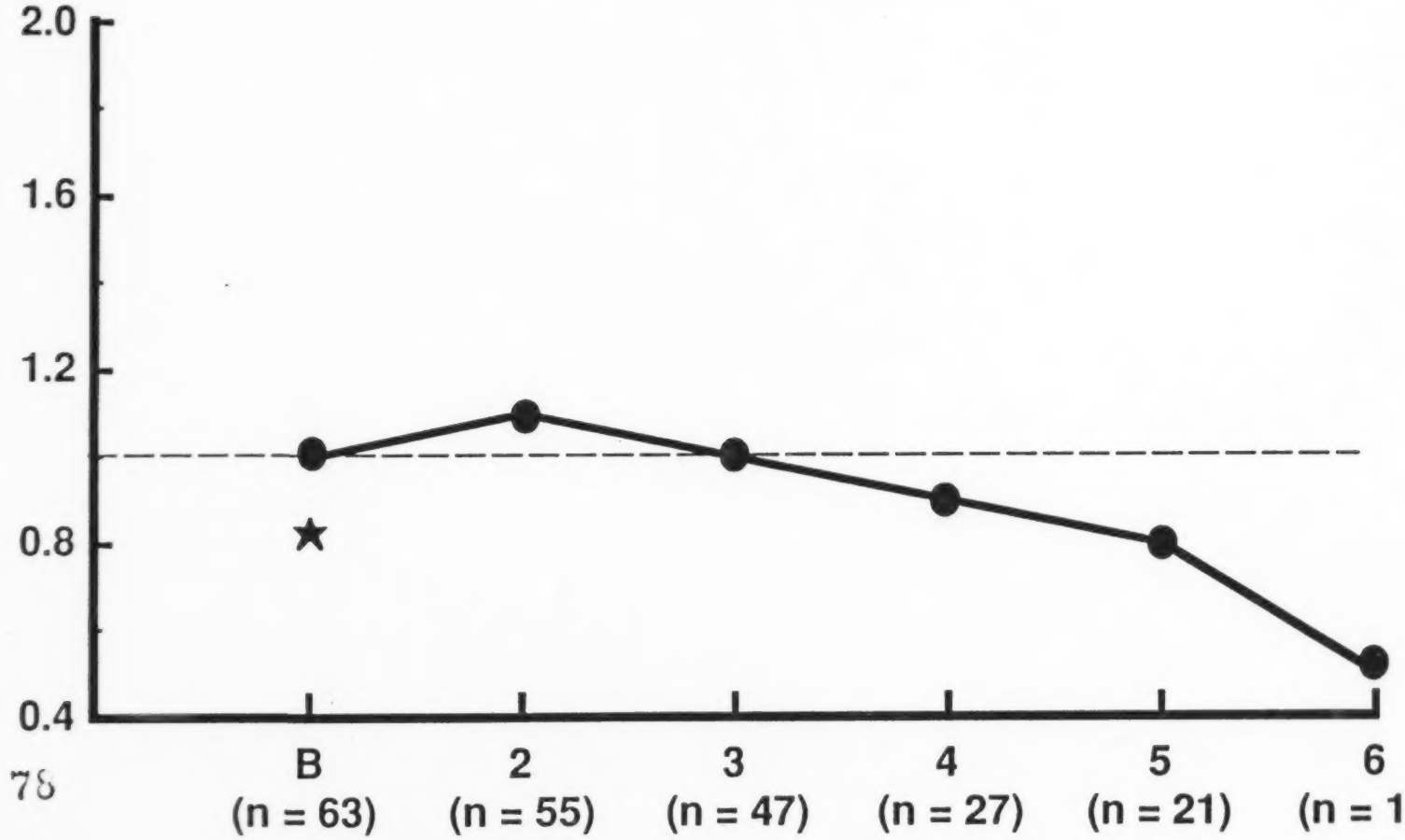


Figure 17
Mean Proportional Change Indexes as Compared to Baseline (All Areas): Code 16, "Cerebral Palsy" (note changing n's)

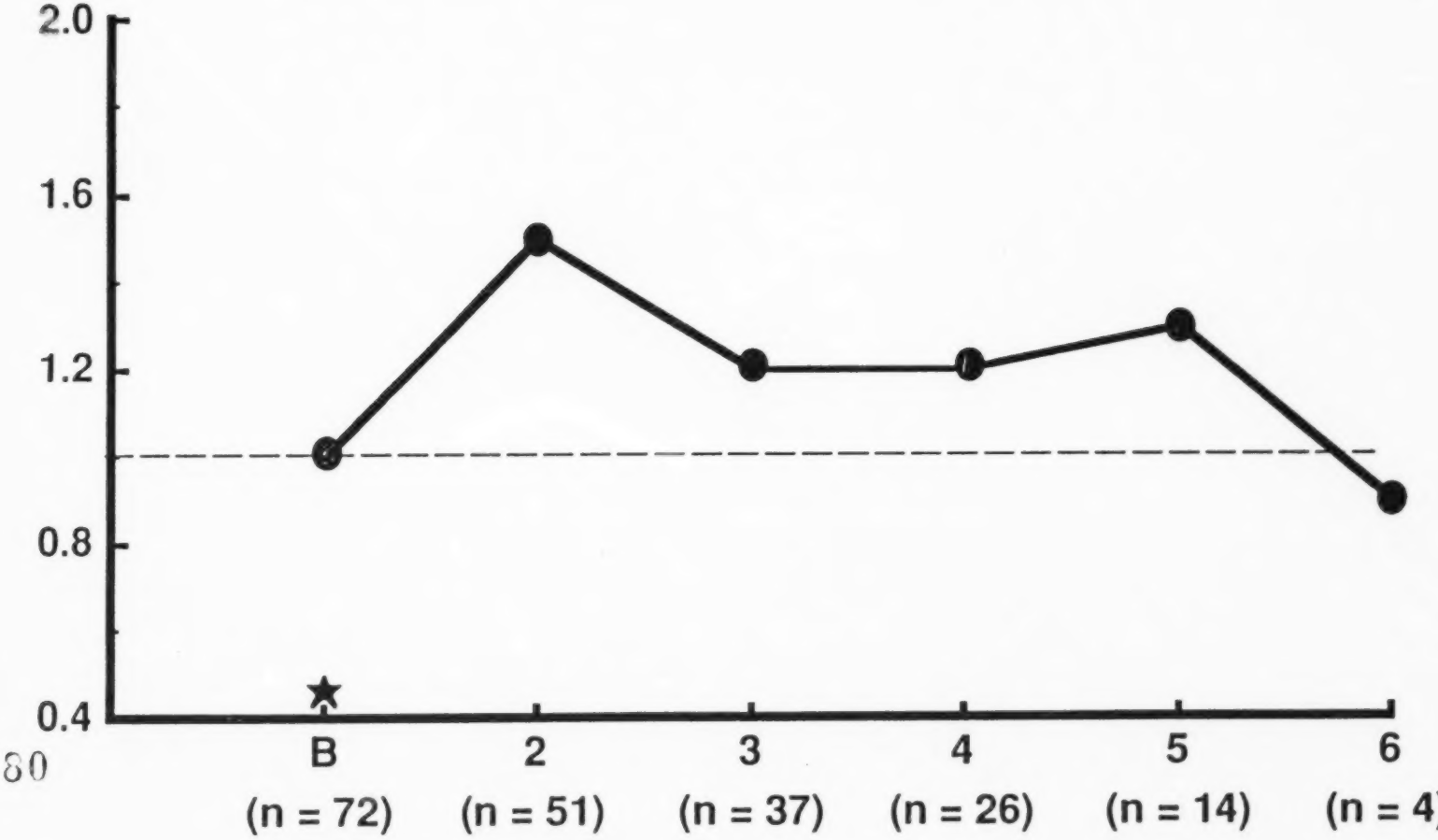


Figure 18
Mean Proportional Change Indexes as Compared to Baseline (All Areas): Code 26, "Neuromotor Disorders" (note changing n's)

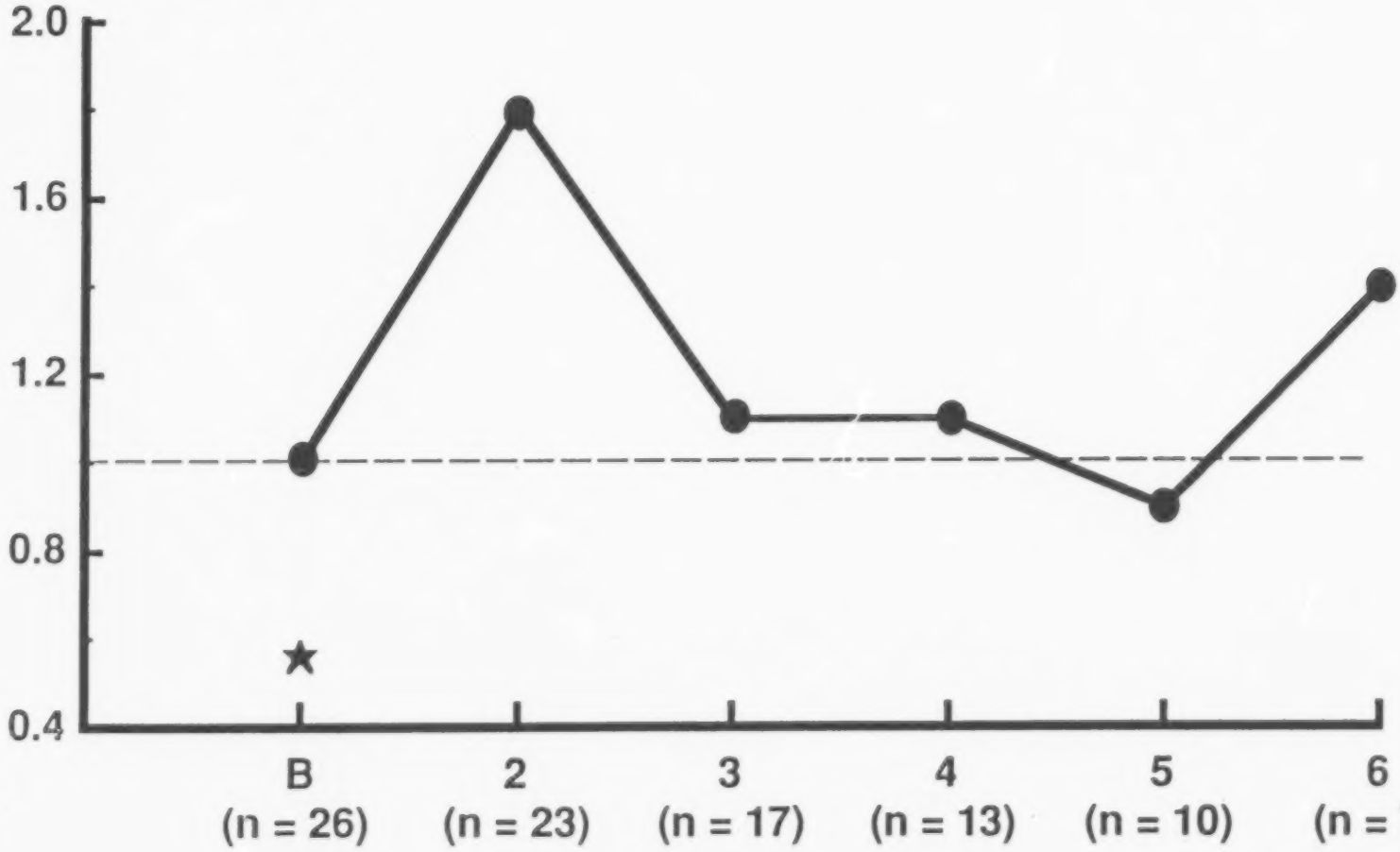


Figure 19
The "Actual" Development of ECIP Children as Compared to Their "Projected" Development (Based on Baseline Assessment) and "Normal" Development (Based on One Month Gain per Month)
All Children (n=700)

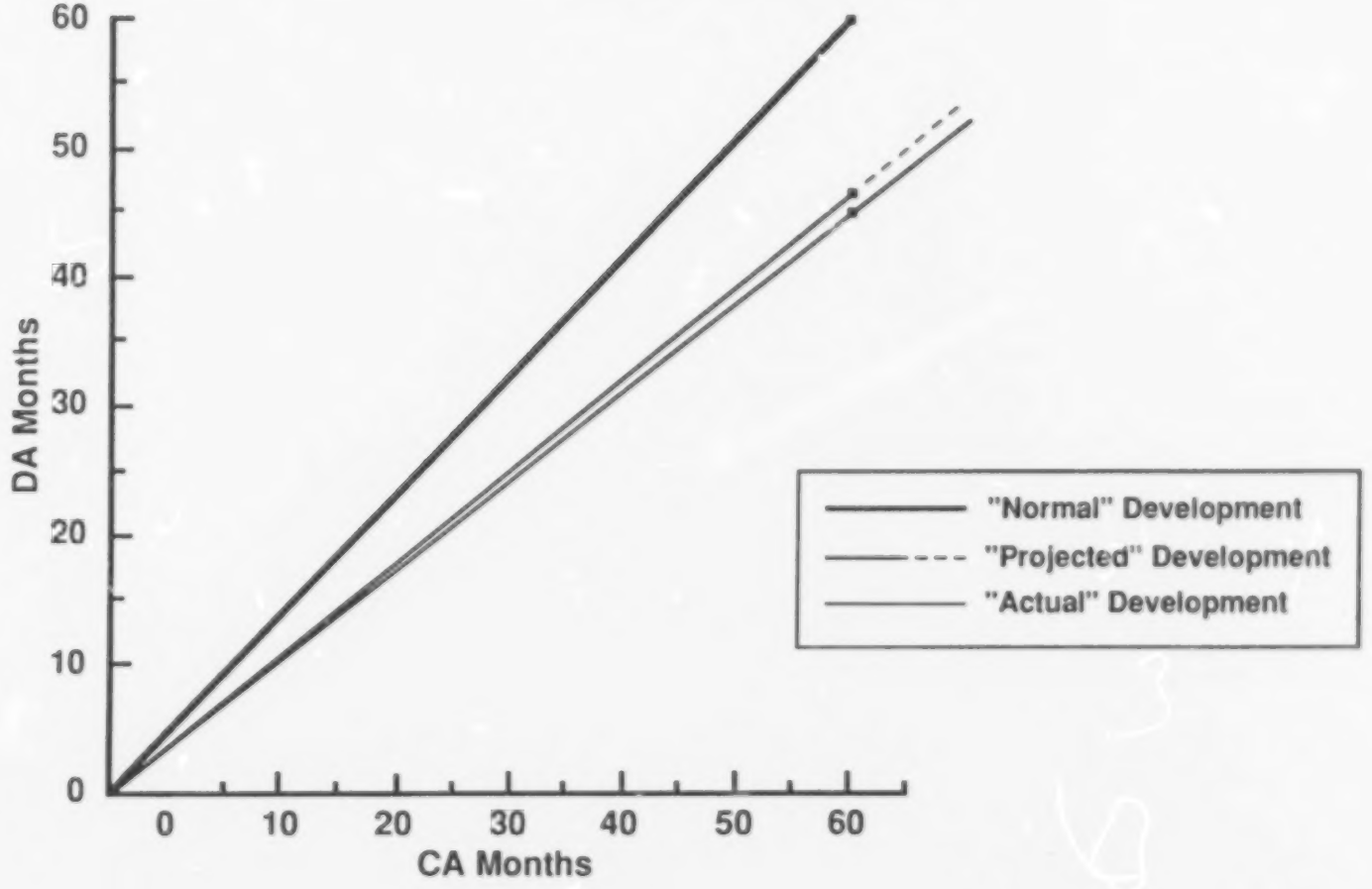


Figure 20
The "Actual" Development of ECIP Children as Compared to Their "Projected" Development (Based on Baseline Assessment) and "Normal" Development (Based on One Month Gain per Month)
Two or More Assessments (n = 486)

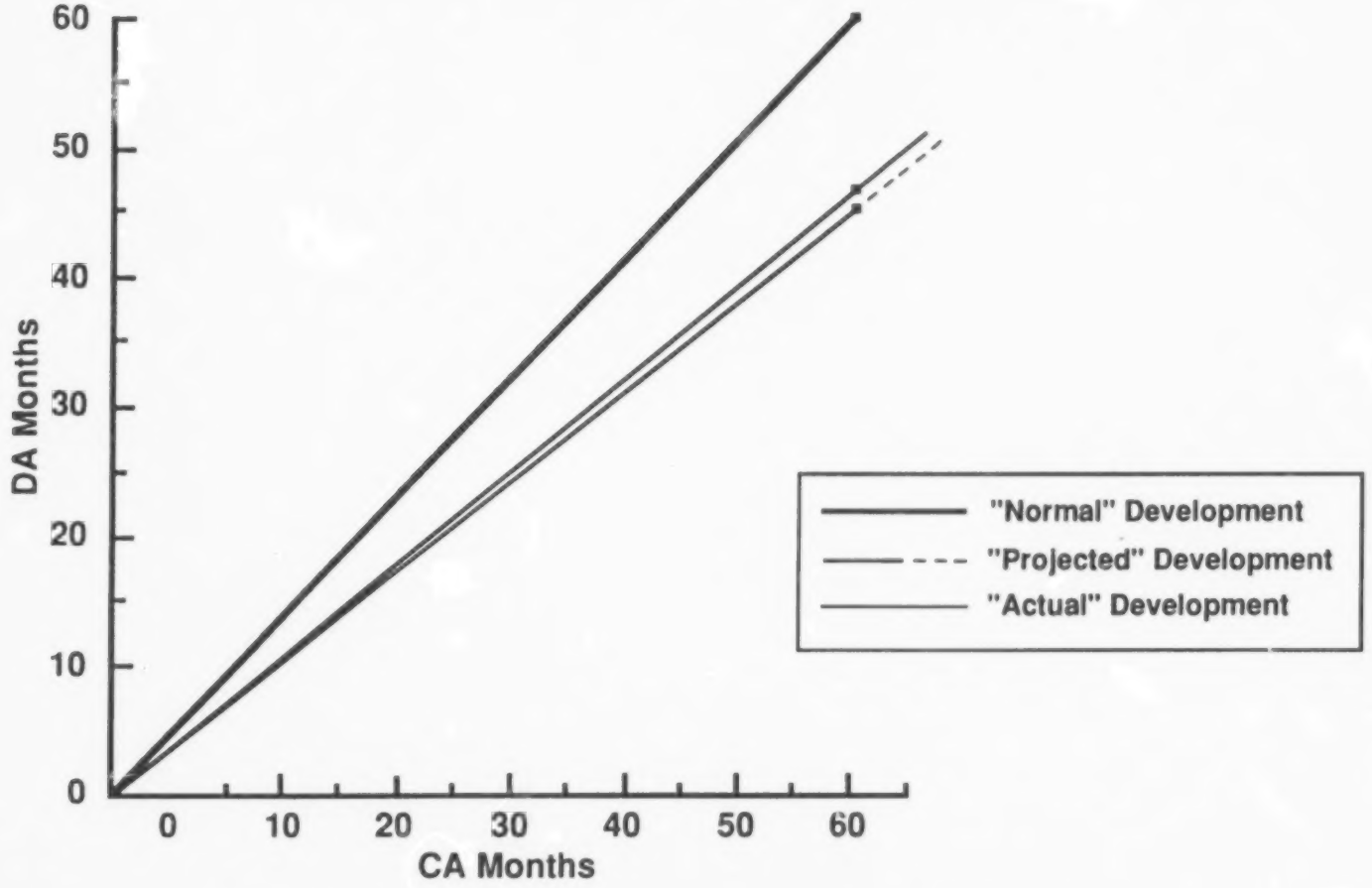


Figure 21
The "Actual" Development of ECIP Children as Compared to Their "Projected" Development (Based on Baseline Assessment) and "Normal" Development (Based on One Month Gain per Month)
Three or More Assessments (n = 322)

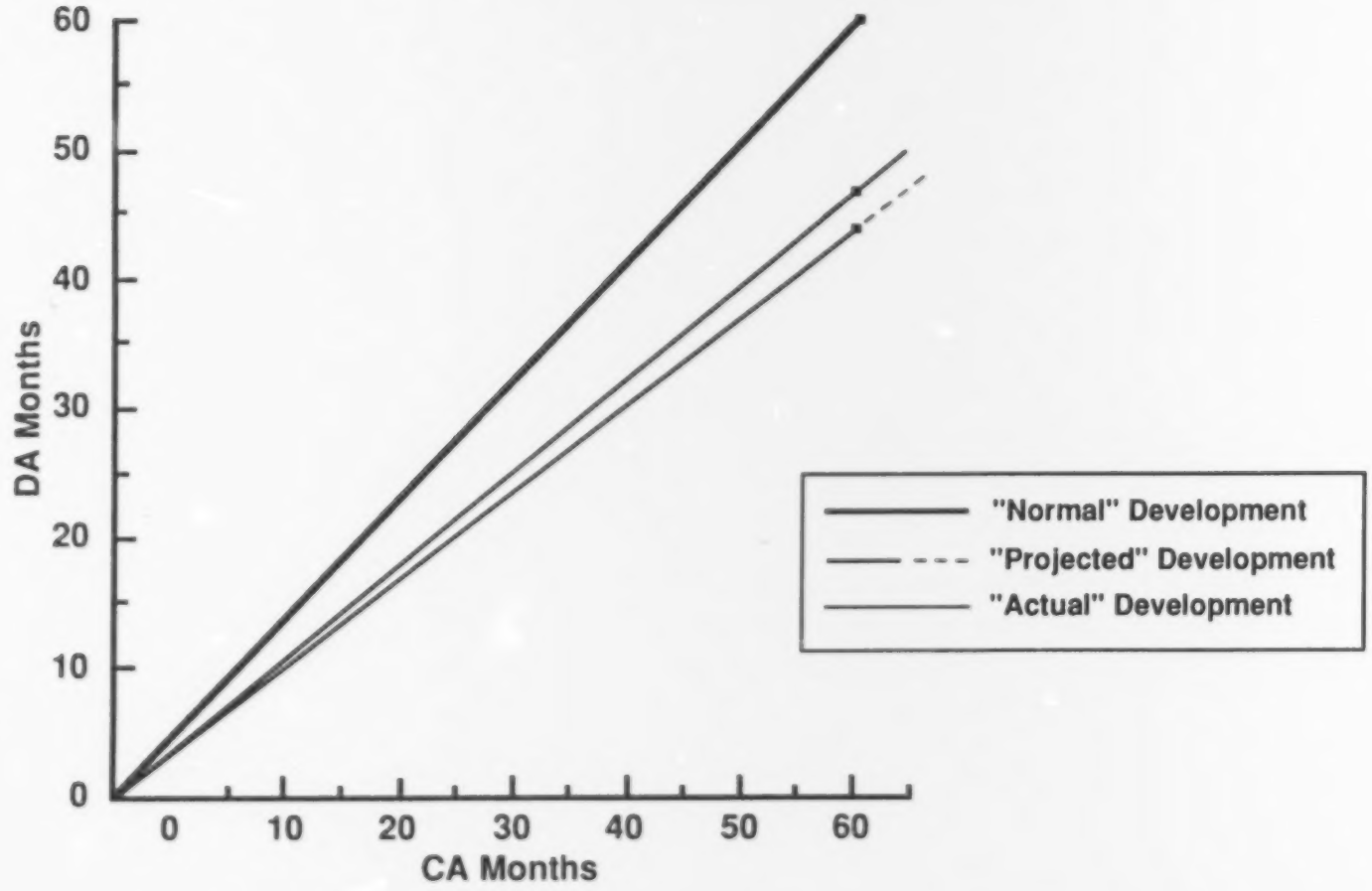


Figure 22

The "Actual" Development of ECIP Children as Compared to Their "Projected" Development (Based on Baseline Assessment) and "Normal" Development (Based on One Month Gain per Month)
Six or More Assessments (n = 68)

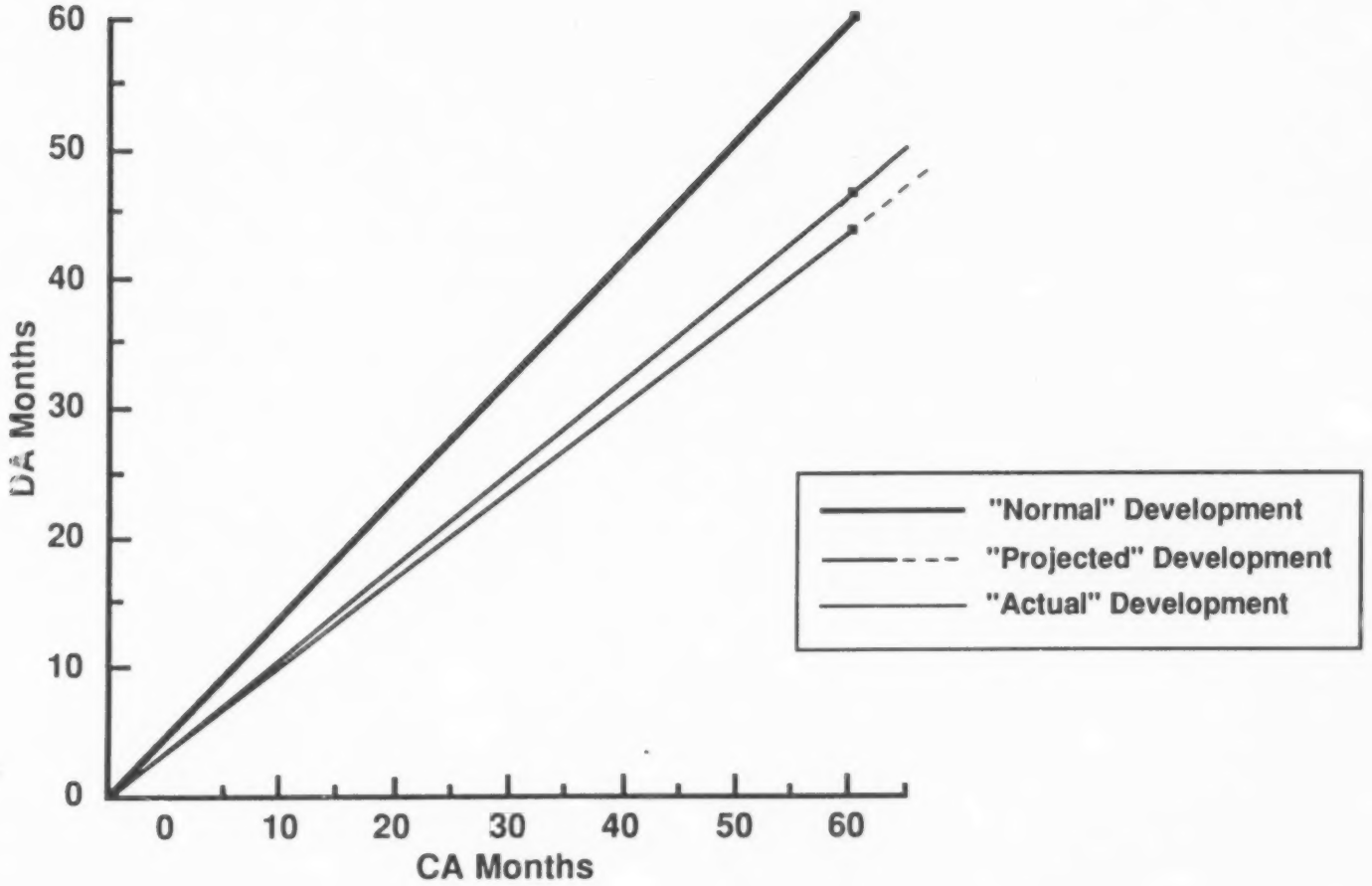


Figure 23

The "Actual" Development of ECIP Children as Compared to Their "Projected" Development (Based on Baseline Assessment) and "Normal" Development (Based on One Month Gain per Month) "Developmental Delay" (Code 1 + 2)

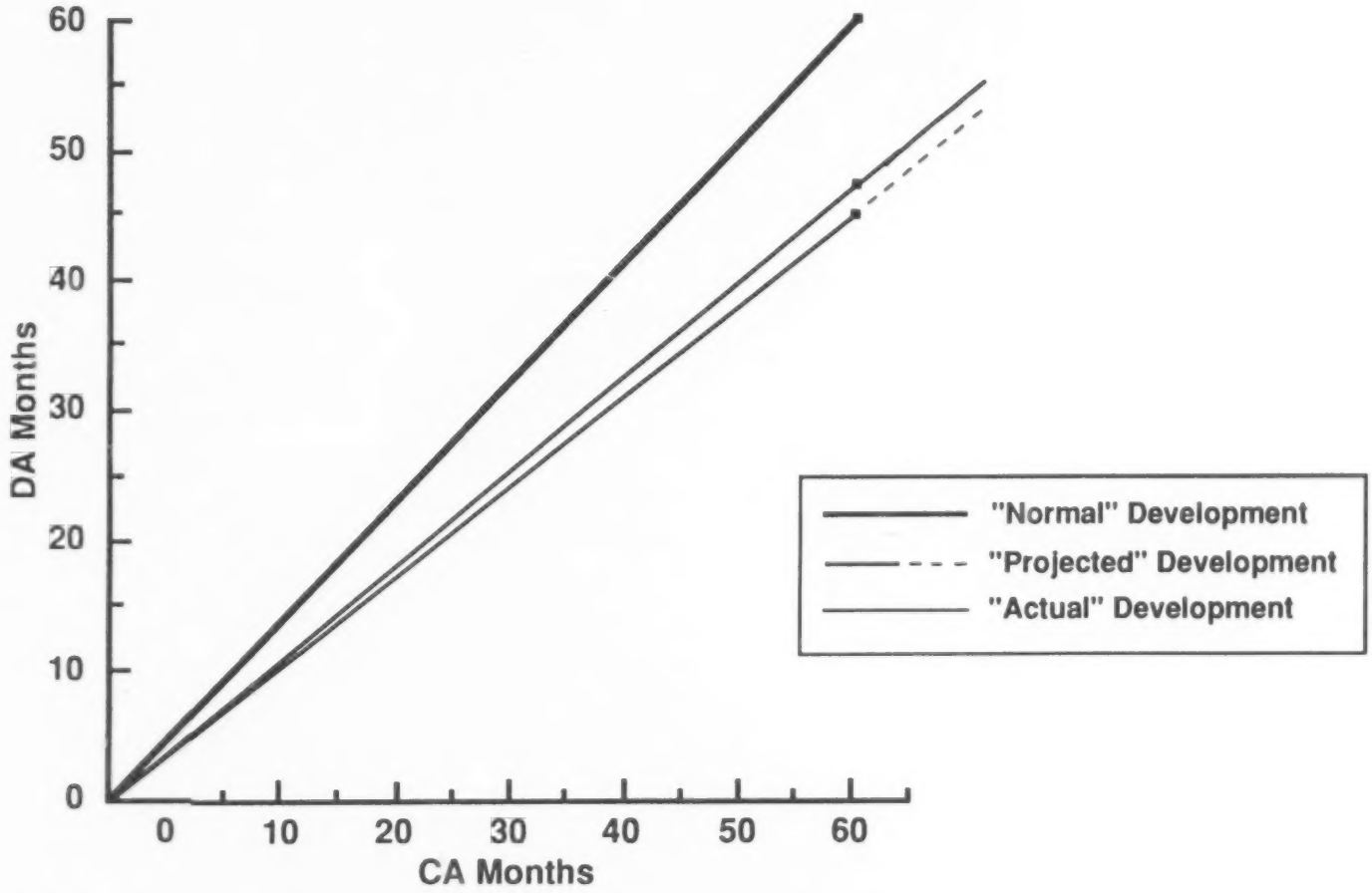


Figure 24

The "Actual" Development of ECIP Children as Compared to Their "Projected" Development (Based on Baseline Assessment) and "Normal" Development (Based on One Month Gain per Month)' "Speech/Language Delay" (Code 12)

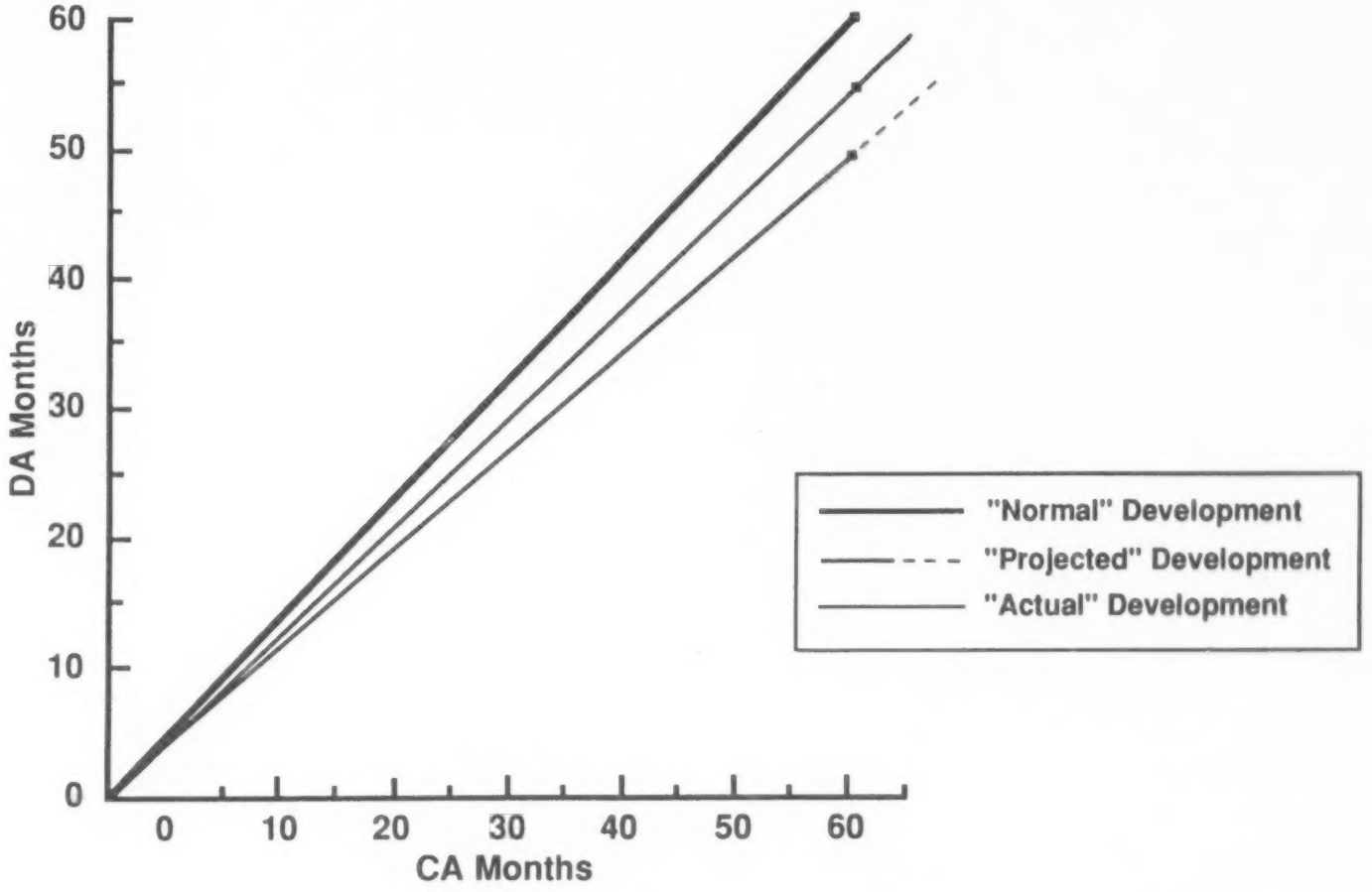


Figure 25

The "Actual" Development of ECIP Children as Compared to Their "Projected" Development (Based on Baseline Assessment) and "Normal" Development (Based on One Month Gain per Month) "Cerebral Palsy/ Neuromotor Disorders (Codes 16+26)

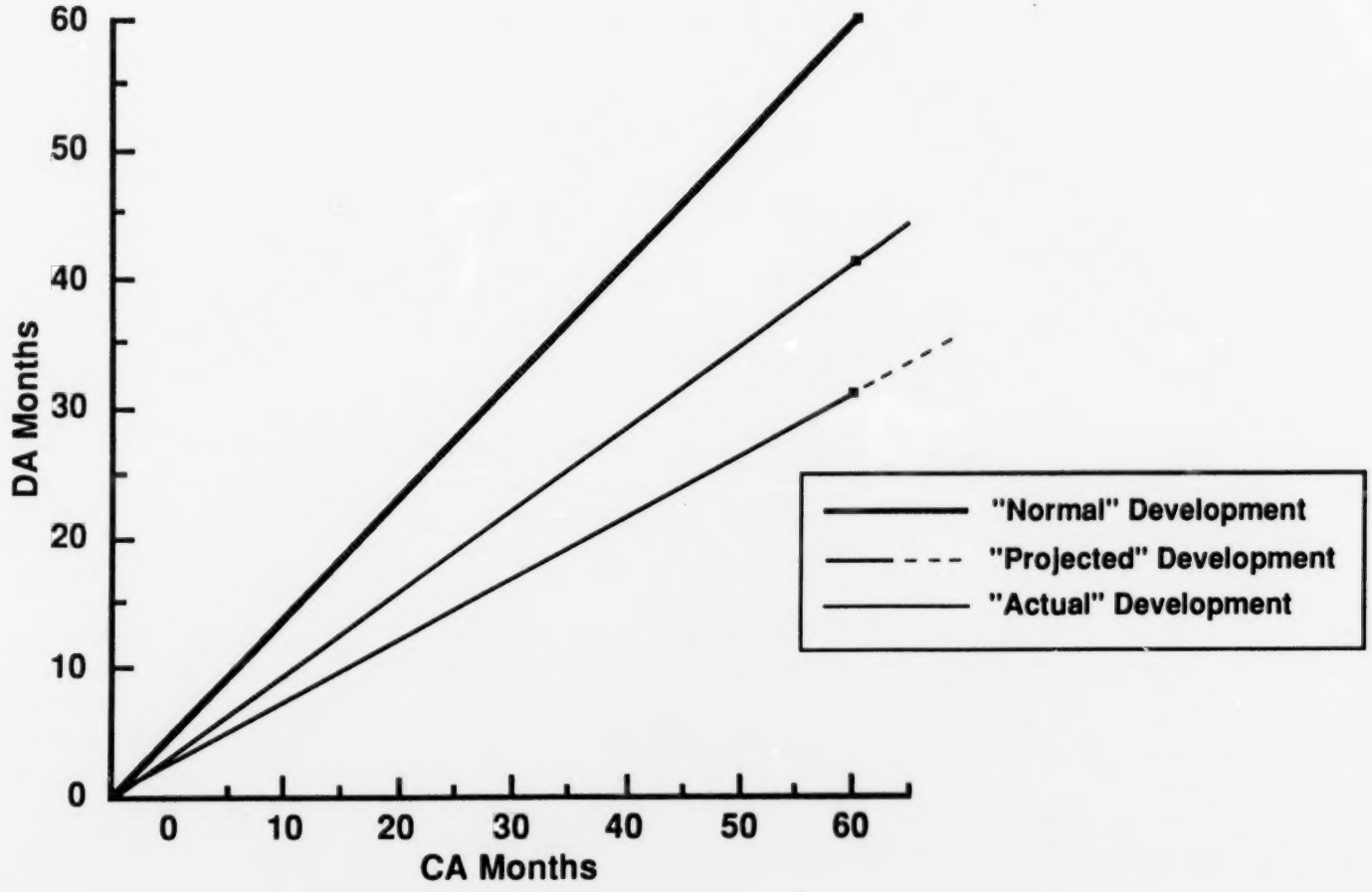


Figure 26

The "Actual" Development of ECIP Children as Compared to Their "Projected" Development (Based on Baseline Assessment) and "Normal" Development (Based on One Month Gain per Month) "At Risk, Environmental" (Code 4)

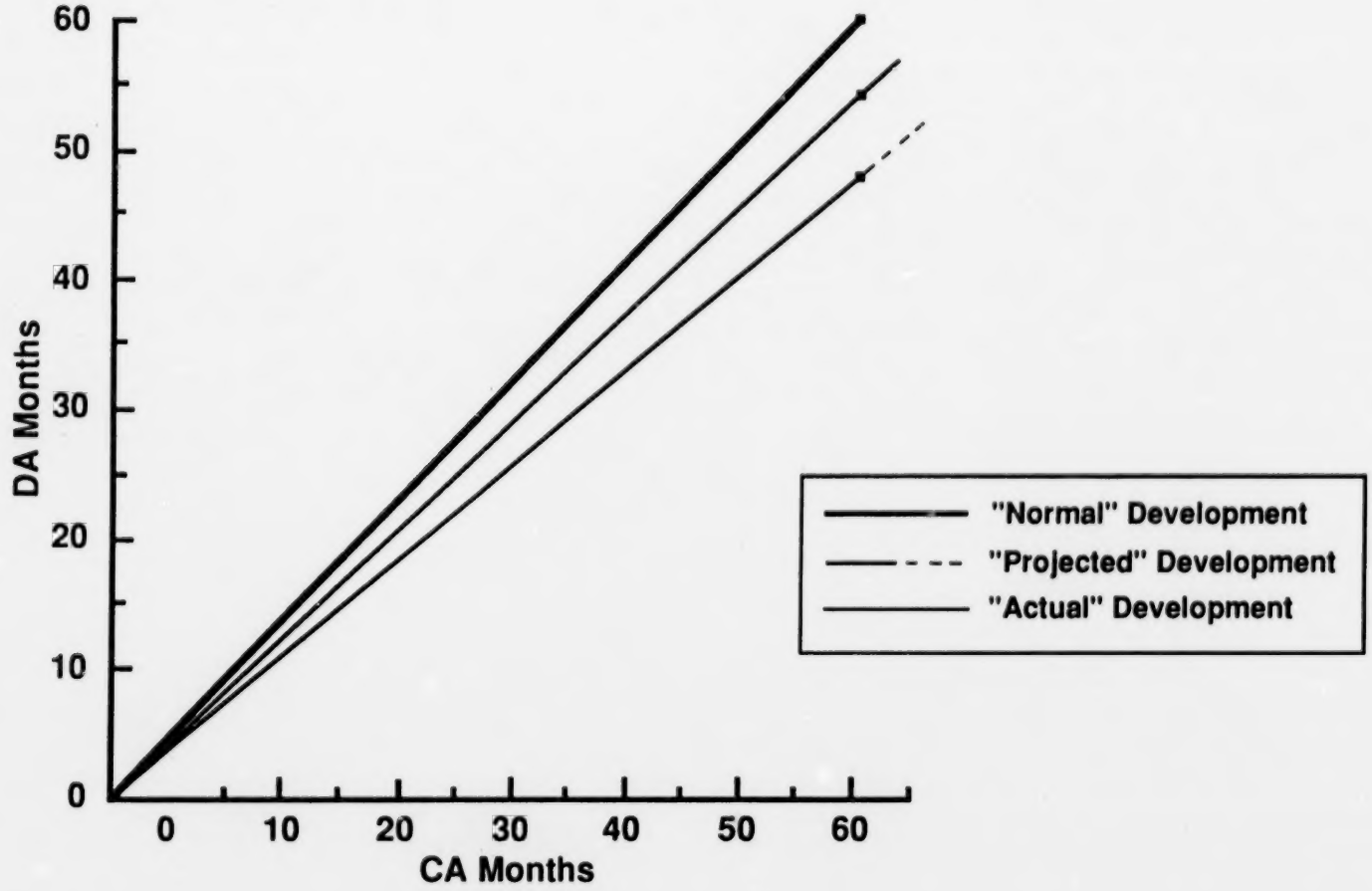


Figure 27

The "Actual" Development of ECIP Children as Compared to Their "Projected" Development (Based on Baseline Assessment) and "Normal" Development (Based on One Month Gain per Month) "Down Syndrome" (Code 8)

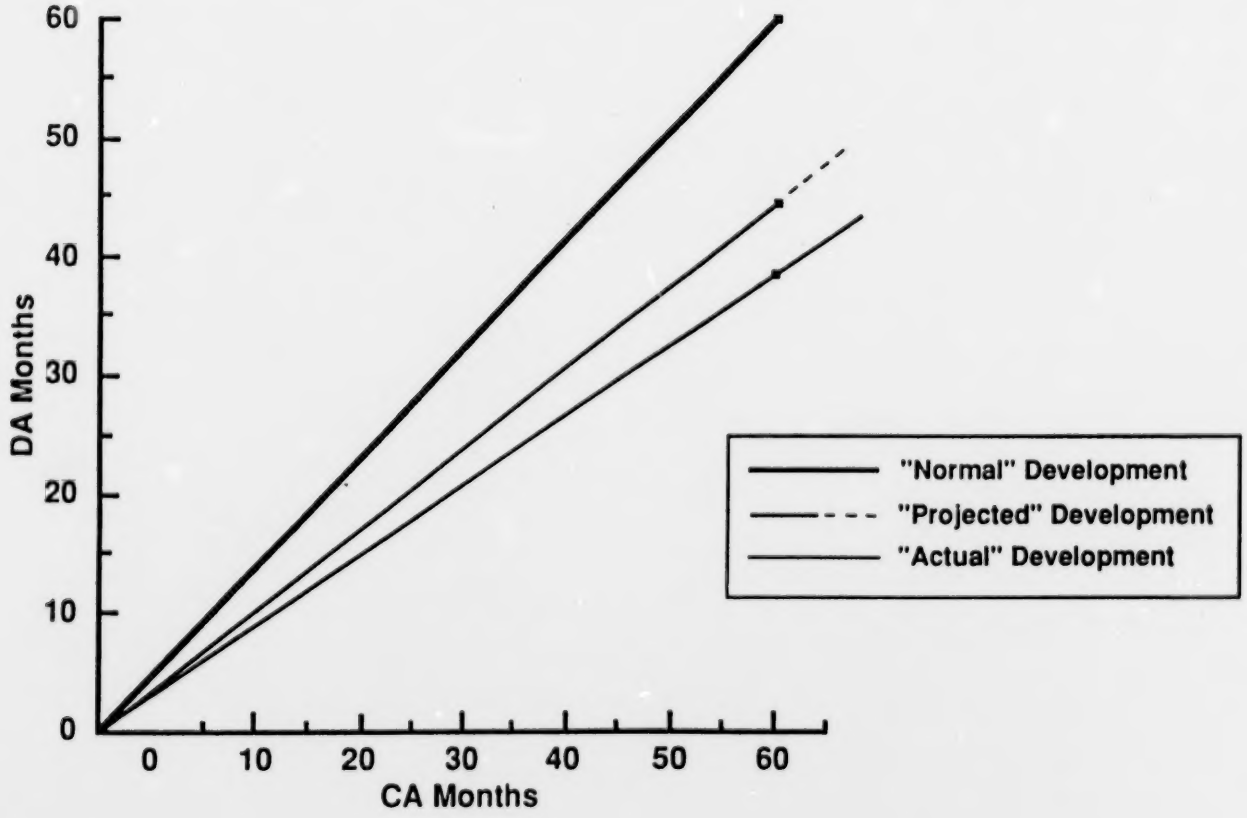
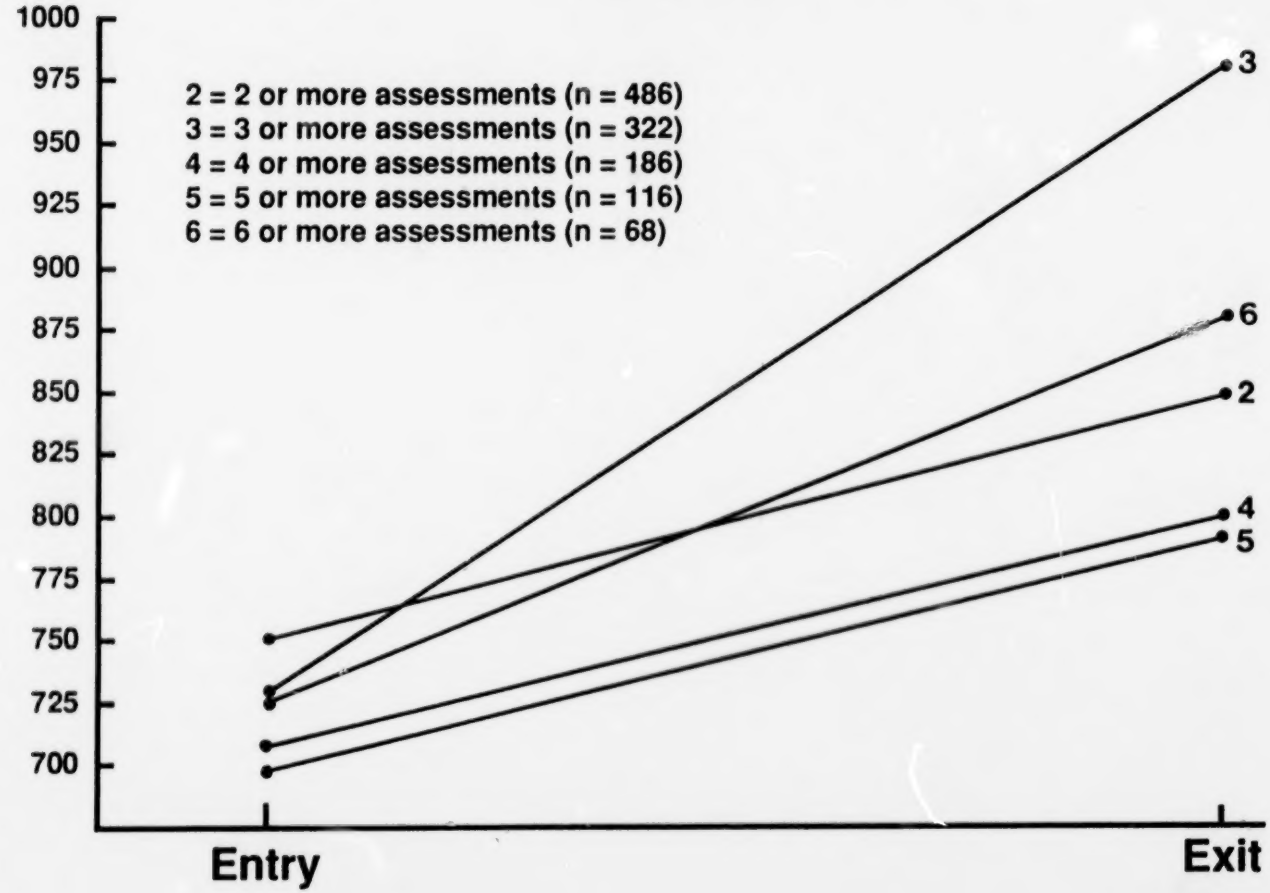


Figure 28

Group Changes in Rates of Development: A Comparison of Baseline $\frac{DA}{CA}$ Ratio $\frac{DA\ (change)}{CA\ (change)}$ Ratio for Time in Intervention



APPENDIX C

Table 1

Frequency Count of All Children by Gender and Assessment Group

	Totals	Boys	Girls
All children	788	490 (62%)	298 (38%)
No ABS-II assessment	88	unknown	unknown
1 or more ABS-II* assessments	700	434 (62%)	266 (38%)
2 or more ABS-II* assessments	486	305 (63%)	181 (38%)
3 or more ABS-II* assessments	322	199 (62%)	123 (38%)
4 or more ABS-II* assessments	186	111 (60%)	75 (40%)
5 or more ABS-II* assessments	116	70 (60%)	46 (40%)
6 or more ABS-II* assessments	68	42 (62%)	26 (38%)

* Alpern, G., Boll, T., and Shearer, M. (1980). Developmental Profile II. Aspen: Psychological Development Publications.

Table 2

All Primary Disabilities
(n = 788)

Code	Description	Frequency	%
1,2	developmental delay	315	40.0
16,26	cerebral palsy/neuromotor disorders	84	10.7
12	speech/language delay	84	10.7
8	Down Syndrome	70	8.9
9	rare syndromes	33	4.2
4	at risk, environmental	29	3.7
20	fetal alcohol syndrome	23	2.9
24,27	unknown/other	21	2.7
5,6,7	mental retardation	19	2.5
3	at risk, biological	19	2.4
19	other physical disabilities	18	2.3
14	hearing impaired	12	1.5
15	vision impaired	11	1.4
13	behaviour disorders	12	1.3
17	spina bifida	9	1.1
23	seizures	6	.8
28	frequent illness/hospitalization	6	.8
11	other metabolic disorders	3	.4
22	autism	3	.4
21	maternal drug abuse	2	.3
25	attention deficit disorders	2	.3
	not listed	7	1.0
			100%

Table 3

All Articulated Disabilities
(n = 788)

Code	Description	Frequency	%*
1,2	developmental delay	443	56.2
12	speech/language delay	224	28.4
16,26	cerebral palsy/neuromotor disorders	117	14.8
4	at risk, environmental	101	12.8
8	Down Syndrome	76	9.6
5,6,7	mental retardation	59	7.4
13	behaviour disorders	58	7.4
19	other physical disabilities	55	7.0
15	vision impaired	50	6.4
24,27	unknown/other	49	6.3
9	rare syndromes	43	5.5
14	hearing impaired	40	5.1
28	frequent illness/hospitalization	38	4.8
20	fetal alcohol syndrome	34	4.3
3	at risk, biological	31	3.9
25	attention deficit disorders	28	3.6
23	seizures	26	3.3
17	spina bifida	10	1.3
11	other metabolic disorders	6	.8
22	autism	5	.6
21	maternal drug abuse	4	.5
10	PKU	3	.4
18	muscular dystrophy	1	.1

* Sums to more than 100% due to the possibility of more than one designated disability per child.

Table 4

All Subjects Categorized by Disabilities
(n = 788)

Code	Description	Disabilities			Totals
		Primary	Secondary	Tertiary	
1,2	developmental delay	315	98	30	443
3	at risk, biological	19	11	1	31
4	at risk, environmental	29	47	25	101
5,6,7	mental retardation	19	28	12	59
8	Down Syndrome	70	6	--	76
9	rare syndromes	33	8	2	43
10	PKU	--	1	2	3
11	other metabolic disorders	3	3	--	6
12	speech/language delay	84	104	36	224
13	behaviour disorders	12	27	19	58
14	hearing impaired	12	17	11	40
15	vision impaired	11	27	12	50
16,26	cerebral palsy/neuromotor disorders	84	25	8	117
17	spina bifida	9	1	--	10
18	muscular dystrophy	--	1	--	1
19	other physical disabilities	18	23	14	55
20	fetal alcohol syndrome	23	9	2	34
21	maternal drug abuse	2	2	--	4
22	autism	3	1	1	5
23	seizures	6	10	10	26
28	frequent illness/hospitalization	6	15	17	38
25	attention deficit disorders	2	9	17	28
24,27	unknown/other	21	15	13	49
	not listed	1	15	49	65
		782	503	281	1566

Table 5

Summary Frequency Counts of Primary Disabilities by Centres

Categories		Centres 02	03	04	05	06	07	08	09	10	11	12	13	Totals
1,2	developmental delay	61	11	39	18	63	29	19	8	3	27	17	16	315
3	at risk, biological	2	3	-	1	1	-	3	3	-	1	24	1	19
4	at risk, environmental	5	1	3	6	2	4	-	1	1	-	2	4	29
5,6,7	mental retardation	1	2	1	3	2	1	-	4	2	3	-	-	19
8	Down Syndrome	10	17	11	4	2	3	5	5	7	2	-	4	70
9	rare syndromes	8	2	3	6	2	5	1	2	1	-	-	13	33
10	PKU	-	-	-	-	-	-	-	-	-	-	-	-	-
11	other metabolic disorders	1	1	1	-	-	-	-	-	-	-	-	-	3
12	speech/language delay	/	-	12	6	29	7	2	5	4	6	-	6	84
13	behaviour disorders	1	1	1	-	-	1	-	1	-	2	2	3	12
14	hearing impaired	-	1	1	-	-	1	-	1	2	4	-	2	12
15	vision impaired	1	-	2	5	-	-	3	-	-	-	-	-	11
16,26	cerebral palsy/ neuromotor disorders	25	5	7	10	5	12	4	4	2	1	1	8	84
17	spina bifida	1	-	2	1	-	4	1	-	-	-	-	-	9
18	muscular dystrophy	-	-	-	-	-	-	-	-	-	-	-	-	-
19	other physical disabilities	-	2	1	2	1	5	-	4	3	-	-	-	18
20	fetal alcohol syndrome	6	2	-	3	6	-	2	-	-	4	-	-	23
21	maternal drug abuse	-	1	-	-	-	-	-	-	-	1	-	-	2
22	autism	-	-	-	2	1	-	-	-	-	-	-	-	3
23	seizures	-	-	-	1	-	4	-	1	-	-	-	-	6
28	frequent illness/ hospitalization	-	-	-	-	-	5	1	-	-	-	-	-	6
25	attention deficit disorders	1	-	-	-	-	-	-	-	1	-	-	-	2
24,27	unknown/other	1	6	4	1	-	2	3	1	-	2	-	1	21
Totals		131	55	88	69	114	87	44	40	26	53	26	48	780

Table 6

Summary Frequency Counts of Secondary Disabilities by Centres

Categories		Centres 02	03	04	05	06	07	08	09	10	11	12	13	Totals
1,2	developmental delay	18	1	29	-	13	18	-	2	12	4	1	-	98
3	at risk, biological	1	-	-	-	1	1	-	-	2	-	3	3	11
4	at risk, environmental	11	5	9	2	6	4	-	-	-	3	6	1	47
5,6,7	mental retardation	5	2	1	5	1	7	2	1	2	1	-	1	28
8	Down Syndrome	2	-	-	-	2	-	-	1	-	-	1	-	6
9	rare syndromes	1	1	1	-	2	-	-	1	-	1	2	-	8
10	PKU	-	-	-	-	1	-	-	-	-	-	-	-	1
11	other metabolic disorders	-	-	-	-	1	1	-	1	-	-	-	-	3
12	speech/language delay	13	3	7	3	24	14	5	1	4	16	5	9	104
13	behaviour disorders	4	1	2	1	3	5	3	1	-	2	-	5	27
14	hearing impaired	4	4	2	-	1	2	-	-	-	2	2	-	17
15	vision impaired	-	9	-	2	5	5	1	2	1	2	-	-	27
16,26	cerebral palsy/ neuromotor disorders	5	-	2	-	7	1	-	2	1	6	1	-	25
17	spina bifida	-	-	-	-	1	-	-	-	-	-	-	-	1
18	muscular dystrophy	-	-	-	-	1	-	-	-	-	-	-	-	1
19	other physical disabilities	2	8	-	-	4	2	1	3	1	-	1	1	23
20	fetal alcohol syndrome	6	1	-	-	2	-	-	-	-	-	-	-	9
21	maternal drug abuse	-	-	-	-	1	-	-	-	-	-	1	-	2
22	autism	-	-	-	-	-	-	-	-	-	1	-	-	1
23	seizures	4	1	4	-	1	-	-	-	-	-	-	-	10
28	frequent illness/ hospitalization	1	2	1	-	4	1	-	2	-	2	1	1	15
25	attention deficit disorders	4	-	-	-	4	-	-	1	-	-	-	-	9
24,27	uknown/other	3	-	4	2	3	-	-	-	-	1	2	-	15
Totals		84	38	62	15	88	61	12	18	23	41	26	21	488

Table 7

Summary Frequency Counts of Tertiary Disabilities by Centres

Categories		Centres												
		02	03	04	05	06	07	08	09	10	11	12	13	Totals
1,2	developmental delay	5	-	5	-	6	7	1	-	2	1	-	3	30
3	at risk, biological	-	-	-	-	-	-	-	-	1	-	-	-	1
4	at risk, environmental	4	1	2	2	12	-	-	1	1	-	2	-	25
5,6,7	mental retardation	1	3	1	-	4	2	-	1	-	-	-	-	12
8	Down Syndrome	-	-	-	-	-	-	-	-	-	-	-	-	-
9	rare syndromes	-	-	2	-	-	-	-	-	-	-	-	-	2
10	PKU	-	-	-	-	-	-	1	-	-	-	-	1	2
11	other metabolic disorders	-	-	-	-	-	-	-	-	-	-	-	-	-
12	speech/language delay	2	1	3	1	12	4	2	2	2	1	2	4	36
13	behaviour disorders	2	-	1	1	5	4	-	-	1	-	2	3	19
14	hearing impaired	2	3	2	-	1	2	-	-	-	-	-	1	11
15	vision impaired	4	-	-	-	3	2	-	1	-	2	-	-	12
16,26	cerebral palsy/ neuromotor disorders	-	-	2	-	2	-	-	-	-	3	1	-	8
17	spina bifida	-	-	-	-	-	-	-	-	-	-	-	-	-
18	muscular dystrophy	-	-	-	-	-	-	-	-	-	-	-	-	-
19	other physical disabilities	-	2	2	-	5	1	-	1	2	1	-	-	14
20	fetal alcohol syndrome	1	-	-	-	1	-	-	-	-	-	-	-	2
21	maternal drug abuse	-	-	-	-	-	-	-	-	-	-	-	-	-
22	autism	-	-	-	-	1	-	-	-	-	-	-	-	1
23	seizures	3	-	1	-	1	3	-	-	-	1	1	-	10
28	frequent illness/ hospitalization	2	4	-	2	3	-	-	4	-	-	2	-	17
25	attention deficit disorders	3	-	-	1	4	1	-	1	1	1	3	2	17
24,27	unknown/other	2	-	1	-	4	1	-	-	-	1	4	-	13
Totals		31	14	22	7	64	27	4	11	10	11	17	14	232

Table 8

Frequency Count of ECIP Children by Primary, Secondary, Tertiary Disabilities for Centre 02 (n = 131)

		Disabilities			Totals
Code	Description	Primary	Secondary	Tertiary	
1,2	developmental delay	61	18	5	84
3	at risk, biological	2	1	--	3
4	at risk, environmental	5	11	4	20
5,6,7	mental retardation	1	5	1	7
8	Down Syndrome	10	2	--	12
9	rare syndromes	8	1	9	18
10	PKU	--	--	--	--
11	other metabolic disorders	1	--	--	1
12	speech/language delay	7	13	2	22
13	behaviour disorders	1	4	2	7
14	hearing impaired	--	4	2	6
15	vision impaired	1	--	4	5
16,26	cerebral palsy/ neuromotor disorders	25	5		30
17	spina bifida	1	--	--	1
18	muscular dystrophy	--	--	--	--
19	other physical disabilities	--	2	--	2
20	fetal alcohol syndrome	6	6	1	13
21	maternal drug abuse	--	--	--	--
22	autism	--	--	--	--
23	seizures	--	4	3	7
28	frequent illness/ hospitalization	--	1	2	3
25	attention deficit disorders	1	4	3	8
24,27	unknown/other	1	3	2	6
		131	84	31	246

Table 9

Frequency Count of ECIP Children by Primary, Secondary, Tertiary Disabilities for Centre 03
(n = 55)

		Disabilities			Totals
Code	Description	Primary	Secondary	Tertiary	
1,2	developmental delay	11	1	--	12
3	at risk, biological	3	--	--	3
4	at risk, environmental	1	5	1	7
5,6,7	mental retardation	2	2	3	6
8	Down Syndrome	17	--	--	17
9	rare syndromes	2	1	--	3
10	PKU	--	--	--	--
11	other metabolic disorders	1	--	--	--
12	speech/language delay	--	3	1	4
13	behaviour disorders	1	1	--	2
14	hearing impaired	1	4	3	8
15	vision impaired	--	9	--	9
16,26	cerebral palsy/ neuromotor disorders	5	--	--	5
17	spina bifida	--	--	--	--
18	muscular dystrophy	--	--	--	--
19	other physical disabilities	2	8	2	12
20	fetal alcohol syndrome	2	1	--	3
21	maternal drug abuse	1	--	--	1
22	autism	--	--	--	--
23	seizures	--	1	--	1
28	frequent illness/ hospitalization	--	2	4	6
25	attention deficit disorders	--	--	--	--
24,27	unknown/other	6	--	--	6
		55	38	14	106

Table 10

Frequency Count of ECIP Children by Primary, Secondary, Tertiary Disabilities for Centre 04
(n = 88)

Code	Description	Disabilities			Totals
		Primary	Secondary	Tertiary	
1,2	developmental delay	39	29	5	73
3	at risk, biological	--	--	--	--
4	at risk, environmental	3	9	2	14
5,6,7	mental retardation	1	1	1	3
8	Down Syndrome	11	--	--	11
9	rare syndromes	3	1	2	6
10	PKU	--	--	--	--
11	other metabolic disorders	1	--	--	--
12	speech/language delay	12	7	3	22
13	behaviour disorders	1	2	1	4
14	hearing impaired	1	2	2	5
15	vision impaired	2	--	--	2
16,26	cerebral palsy/ neuromotor disorders	7	2	2	11
17	spina bifida	2	--	--	2
18	muscular dystrophy	--	--	--	--
19	other physical disabilities	1	--	2	3
20	fetal alcohol syndrome	--	--	--	--
21	maternal drug abuse	--	--	--	--
22	autism	--	--	--	--
23	seizures	--	4	1	5
28	frequent illness/ hospitalization	--	1	--	1
25	attention deficit disorders	--	--	--	--
24,27	unknown/other	4	4	1	9
	no disability recorded	1	--	--	--
		89	62	22	172

Table 11

Frequency Count of ECIP Children by Primary, Secondary, Tertiary Disabilities for Centre 05
(n = 69)

Code	Description	Disabilities			Totals
		Primary	Secondary	Tertiary	
1,2	developmental delay	18	--	--	18
3	at risk, biological	1	--	--	1
4	at risk, environmental	6	2	2	10
5,6,7	mental retardation	3	5	--	8
8	Down Syndrome	4	--	--	4
9	rare syndromes	6	--	--	6
10	PKU	--	--	--	--
11	other metabolic disorders	--	--	--	--
12	speech/language delay	6	3	1	10
13	behaviour disorders	--	1	1	2
14	hearing impaired	--	--	--	--
15	vision impaired	5	--	--	7
16,26	cerebral palsy/ neuromotor disorders	10	--	--	10
17	spina bifida	1	--	--	1
18	muscular dystrophy	--	--	--	--
19	other physical disabilities	2	--	--	2
20	fetal alcohol syndrome	3	--	--	3
21	maternal drug abuse	--	--	--	--
22	autism	2	--	--	2
23	seizures	1	--	--	1
28	frequent illness/ hospitalization	--	--	2	2
25	attention deficit disorders	--	--	1	1
24,27	unknown/other	1	2	--	3
		69	15	7	91

Table 12

Frequency Count of ECIP Children by Primary, Secondary, Tertiary Disabilities for Centre 06
(n = 114)

Code	Description	Disabilities			Totals
		Primary	Secondary	Tertiary	
1,2	developmental delay	63	13	6	82
3	at risk, biological	1	1	--	2
4	at risk, environmental	2	6	12	20
5,6,7	mental retardation	2	1	4	7
8	Down Syndrome	2	2	--	4
9	rare syndromes	2	2	--	4
10	PKU	--	1	--	1
11	other metabolic disorders	--	1	--	1
12	speech/language delay	29	24	12	65
13	behaviour disorders	--	3	5	8
14	hearing impaired	--	1	1	2
15	vision impaired	--	5	3	8
16,26	cerebral palsy/ neuromotor disorders	5	7	2	14
17	spina bifida	--	1	--	1
18	muscular dystrophy	--	1	--	1
19	other physical disabilities	1	4	5	10
20	fetal alcohol syndrome	6	2	1	9
21	maternal drug abuse	--	1	--	1
22	autism	1	--	1	2
23	seizures	--	1	1	2
28	frequent illness/ hospitalzation	--	4	3	7
25	attention deficit disorders	--	4	4	8
24,27	unknown/other	--	3	4	7
		114	88	64	266

Table 13

Frequency Count of ECIP Children by Primary, Secondary, Tertiary Disabilities for Centre 07
(n = 87)

Code	Description	Disabilities			Totals
		Primary	Secondary	Tertiary	
1,2	developmental delay	29	18	7	54
3	at risk, biological	--	1	--	1
4	at risk, environmental	4	4	--	8
5,6,7	mental retardation	1	7	2	10
8	Down Syndrome	3	--	--	3
9	rare syndromes	5	--	--	5
10	PKU	--	--	--	--
11	other metabolic disorders	--	1	--	1
12	speech/language delay	7	14	4	25
13	behaviour disorders	1	5	4	10
14	hearing impaired	1	2	2	5
15	vision impaired	--	5	2	7
16,26	cerebral palsy/ neuromotor disorders	12	1	--	13
17	spina bifida	4	--	--	4
18	muscular dystrophy	--	--	--	--
19	other physical disabilities	5	2	1	8
20	fetal alcohol syndrome	--	--	--	--
21	maternal drug abuse	--	--	--	--
22	autism	--	--	--	--
23	seizures	4	--	3	7
28	frequent illness/ hospitalization	5	1	--	6
25	attention deficit disorders	--	--	1	1
24,27	unknown/other	2	--	1	3
		87	61	27	173

Table 14

Frequency Count of ECIP Children by Primary, Secondary, Tertiary Disabilities for Centre 08
(n = 44)

Code	Description	Disabilities			Totals
		Primary	Secondary	Tertiary	
1,2	developmental delay	19	--	1	20
3	at risk, biological	3	--	--	3
4	at risk, environmental	--	--	--	--
5,6,7	mental retardation	--	2	--	2
8	Down Syndrome	5	--	--	5
9	rare syndromes	1	--	--	1
10	PKU	--	--	1	1
11	other metabolic disorders	--	--	--	--
12	speech/language delay	2	5	2	9
13	behaviour disorders	--	3	--	3
14	hearing impaired	--	--	--	--
15	vision impaired	3	1	--	4
16,26	cerebral palsy/ neuromotor disorders	4	--	--	4
17	spina bifida	1	--	--	1
18	muscular dystrophy	--	--	--	--
19	other physical disabilities	--	1	--	1
20	fetal alcohol syndrome	2	--	--	2
21	maternal drug abuse	--	--	--	--
22	autism	--	--	--	--
23	seizures	--	--	--	--
28	frequent illness/ hospitalization	1	--	--	1
25	attention deficit disorders	--	--	--	--
24,27	unknown/other	3	--	--	3
		44	12	4	60

Table 15

Frequency Count of ECIP Children by Primary, Secondary, Tertiary Disabilities for Centre 09
(n = 40)

Code	Description	Disabilities			Totals
		Primary	Secondary	Tertiary	
1,2	developmental delay	8	2	--	10
3	at risk, biological	3	--	--	3
4	at risk, environmental	1	--	1	2
5,6,7	mental retardation	4	1	1	6
8	Down Syndrome	5	1	--	6
9	rare syndromes	2	1	--	3
10	PKU	--	--	--	--
11	other metabolic disorders	--	1	--	1
12	speech/language delay	5	1	2	8
13	behaviour disorders	1	1	--	2
14	hearing impaired	1	--	--	1
15	vision impaired	--	2	1	3
16,26	cerebral palsy/ neuromotor disorders	4	2	--	6
17	spina bifida	--	--	--	--
18	muscular dystrophy	--	--	--	--
19	other physical disabilities	4	3	1	8
20	fetal alcohol syndrome	--	--	--	--
21	maternal drug abuse	--	--	--	--
22	autism	--	--	--	--
23	seizures	1	--	--	1
28	frequent illness/ hospitalization	--	2	4	6
25	attention deficit disorders	--	1	1	2
24,27	unknown/other	1	--	--	1
		40	18	11	69

Table 16

Frequency Count of ECIP Children by Primary, Secondary, Tertiary Disabilities for Centre 10 (n = 26)

Code	Description	Disabilities			Totals
		Primary	Secondary	Tertiary	
1,2	developmental delay	3	12	2	17
3	at risk, biological	--	2	1	3
4	at risk, environmental	1	--	1	2
5,6,7	mental retardation	2	2	--	4
8	Down Syndrome	7	--	--	7
9	rare syndromes	1	--	--	1
10	PKU	--	--	--	--
11	other metabolic disorders	--	--	--	--
12	speech/language delay	4	4	2	10
13	behaviour disorders	--	--	1	1
14	hearing impaired	2	--	--	2
15	vision impaired	--	1	--	1
16,26	cerebral palsy/ neuromotor disorders	2	1	--	3
17	spina bifida	--	--	--	--
18	muscular dystrophy	--	--	--	--
19	other physical disabilities	3	1	2	6
20	fetal alcohol syndrome	--	--	--	--
21	maternal drug abuse	--	--	--	--
22	autism	--	--	--	--
23	seizures	--	--	--	--
28	frequent illness/ hospitalization	--	--	--	--
25	attention deficit disorders	1	--	1	2
24,27	unknown/other	--	--	--	--
		26	23	10	59

Table 17

Frequency Count of ECIP Children by Primary, Secondary, Tertiary Disabilities for Centre 11
(n = 53)

Code	Description	Disabilities			Totals
		Primary	Secondary	Tertiary	
1,2	developmental delay	27	4	1	32
3	at risk, biological	1	--	--	1
4	at risk, environmental	--	3	--	3
5,6,7	mental retardation	3	1	--	4
8	Down Syndrome	2	--	--	2
9	rare syndromes	--	1	--	1
10	PKU	--	--	--	--
11	other metabolic disorders	--	--	--	--
12	speech/language delay	6	16	1	23
13	behaviour disorders	2	2	--	4
14	hearing impaired	4	2	--	6
15	vision impaired	--	2	2	4
16,26	cerebral palsy/ neuromotor disorders	1	6	3	10
17	spina bifida	--	--	--	--
18	muscular dystrophy	--	--	--	--
19	other physical disabilities	--	--	1	1
20	fetal alcohol syndrome	4	--	--	4
21	maternal drug abuse	1	--	--	1
22	autism	--	1	--	1
23	seizures	--	--	1	1
28	frequent illness/ hospitalization	--	2	--	2
25	attention deficit disorders	--	--	1	1
24,27	unknown/other	2	1	1	4
		53	41	11	105

Table 18

Frequency Count of ECIP Children by Primary, Secondary, Tertiary Disabilities for Centre 12
(n = 26)

Code	Description	Disabilities			Totals
		Primary	Secondary	Tertiary	
1,2	developmental delay	17	1	--	18
3	at risk, biological	4	3	--	7
4	at risk, environmental	2	6	2	10
5,6,7	mental retardation	--	--	--	--
8	Down Syndrome	--	1	--	1
9	rare syndromes	--	2	--	2
10	PKU	--	--	--	--
11	other metabolic disorders	--	--	--	--
12	speech/language delay	--	5	2	7
13	behaviour disorders	2	--	2	4
14	hearing impaired	--	2	--	2
15	vision impaired	--	--	--	--
16,26	cerebral palsy/ neuromotor disorders	1	1	1	3
17	spina bifida	--	--	--	--
18	muscular dystrophy	--	--	--	--
19	other physical disabilities	--	1	--	1
20	fetal alcohol syndrome	--	--	--	--
21	maternal drug abuse	--	1	--	1
22	autism	--	--	--	--
23	seizures	--	--	1	1
28	frequent illness/ hospitalization	--	1	2	3
25	attention deficit disorders	--	--	3	3
24,27	unknown/other	--	2	4	6
		26	26	17	69

Table 19

Frequency Count of ECIP Children by Primary, Secondary, Tertiary Disabilities for Centre 13
(n = 48)

Code	Description	Disabilities			Totals
		Primary	Secondary	Tertiary	
1,2	developmental delay	16	--	3	19
3	at risk, biological	1	3	--	4
4	at risk, environmental	4	1	--	5
5,6,7	mental retardation	--	1	--	1
8	Down Syndrome	4	--	--	4
9	rare syndromes	3	--	--	3
10	PKU	--	--	1	1
11	other metabolic disorders	--	--	--	--
12	speech/language delay	6	9	4	19
13	behaviour disorders	3	5	3	11
14	hearing impaired	2	--	1	3
15	vision impaired	--	--	--	--
16,26	cerebral palsy/ neuromotor disorders	8	--	--	8
17	spina bifida	--	--	--	--
18	muscular dystrophy	--	--	--	--
19	other physical disabilities	--	1	--	1
20	fetal alcohol syndrome	--	--	--	--
21	maternal drug abuse	--	--	--	--
22	autism	--	--	--	--
23	seizures	--	--	--	--
28	frequent illness/ hospitalization	--	1	--	1
25	attention deficit disorders	--	--	2	2
24,27	unknown/other	1	--	--	1
		48	21	14	83

Table 20

Subjects Having Two or More Assessments Categorized by Disabilities
(n = 486)

		Disabilities			Totals
Code	Description	Primary	Secondary	Tertiary	
1,2	developmental delay	186	70	23	279
3	at risk, biological	9	6	1	16
4	at risk, environmental	18	25	12	55
5,6,7	mental retardation	12	19	5	36
8	Down Syndrome	51	4	--	55
9	rare syndromes	24	7	2	33
10	PKU	--	1	1	2
11	other metabolic disorders	2	1	--	3
12	speech/language delay	51	67	26	144
13	behaviour disorders	7	19	14	40
14	hearing impaired	5	8	5	18
15	vision impaired	8	14	11	33
16,26	cerebral palsy/ neuromotor disorders	46	20	8	74
17	spina bifida	6	--	--	6
18	muscular dystrophy	--	--	--	--
19	other physical disabilities	11	14	10	35
20	fetal alcohol syndrome	18	6	2	26
21	maternal drug abuse	1	2	--	3
22	autism	2	--	1	3
23	seizures	1	8	8	17
28	frequent illness/ hospitalization	4	11	13	28
25	attention deficit disorders	2	6	11	19
24,27	unknown/other	16	12	6	34

Table 21

Subjects Having Three or More Assessments Categorized by Disabilities
(n = 322)

Code	Description	Disabilities			Totals
		Primary	Secondary	Tertiary	
1,2	developmental delay	132	45	18	195
3	at risk, biological	3	3	--	6
4	at risk, environmental	11	17	9	37
5,6,7	mental retardation	9	13	5	27
8	Down Syndrome	43	4	--	47
9	rare syndromes	14	7	2	23
10	PKU	--	--	1	1
11	other metabolic disorders	1	1	--	2
12	speech/language delay	25	47	16	88
13	behaviour disorders	6	9	8	23
14	hearing impaired	3	4	3	10
15	vision impaired	7	11	8	26
16,26	cerebral palsy neuromotor disorders	29	18	7	54
17	spina bifida	3	--	--	3
18	muscular dystrophy	--	--	--	--
19	other physical disabilities	6	10	6	22
20	fetal alcohol syndrome	9	5	1	15
21	maternal drug abuse	--	1	--	1
22	autism	2	--	--	2
23	seizures	--	5	7	12
28	frequent illness/ hospitalization	2	6	9	17
25	attention deficit disorders	1	4	6	11
24,27	unknown/other	11	6	5	22

Table 22

Subjects Having Four or More Assessments Categorized by Disabilities
(n = 186)

		Disabilities			Totals
Code	Description	Primary	Secondary	Tertiary	
1,2	developmental delay	75	28	9	112
3	at risk, biological	2	2	--	4
4	at risk, environmental	9	12	6	27
5,6,7	mental retardation	4	5	3	12
8	Down Syndrome	21	4	--	25
9	rare syndromes	7	6	2	15
10	PKU	--	--	--	10
11	other metabolic disorders	--	1	--	1
12	speech/language delay	10	22	11	43
13	behaviour disorders	2	6	6	14
14	hearing impaired	3	2	1	6
15	vision impaired	4	7	6	17
16,26	cerebral palsy/ neuromotor disorders	21	12	6	39
17	spina bifida	4	--	--	4
18	muscular dystrophy	--	--	--	--
19	other physical disabilities	3	5	5	13
20	fetal alcohol syndrome	8	4	--	12
21	maternal drug abuse	--	--	--	--
22	autism	1	--	--	1
23	seizures	--	3	5	8
28	frequent illness hospitalization	2	3	4	9
25	attention deficit disorders	--	1	2	3
24,27	unknown/other	7	3	4	14

Table 23

Subjects Having Five or More Assessments Categorized by Disabilities
(n = 116)

Code	Description	Disabilities			Totals
		Primary	Secondary	Tertiary	
1,2	developmental delay	44	20	6	70
3	at risk, biological	1	2	--	3
4	at risk, environmental	6	5	3	14
5,6,7	mental retardation	3	3	1	7
8	Down Syndrome	15	4	--	19
9	rare syndromes	4	5	1	10
10	PKU	--	--	--	--
11	other metabolic disorders	--	1	--	1
12	speech/language delay	6	9	7	22
13	behaviour disorders	--	4	1	5
14	hearing impaired	1	--	1	2
15	vision impaired	4	3	4	11
16,26	cerebral palsy/ neuromotor disorders	12	9	3	24
17	spina bifida	2	--	--	2
18	muscular dystrophy	--	--	--	--
19	other physical disabilities	3	5	5	13
20	fetal alcohol syndrome	3	3	--	6
21	maternal drug abuse	--	--	--	--
22	autism	1	--	--	1
23	seizures	--	2	4	6
28	frequent illness/ hospitalization	2	1	3	6
25	attention deficit disorders	--	--	2	2
24,27	unknown/other	5	1	4	10

Table 24

Subjects Having Six or More Assessments Categorized by Disabilities
(n = 68)

		Disabilities			Totals
Code	Description	Primary	Secondary	Tertiary	
1,2	developmental delay	24	15	4	43
3	at risk, biological	1	1	--	2
4	at risk, environmental	3	4	1	8
5,6,7	mental retardation	1	2	--	3
8	Down Syndrome	12	2	--	14
9	rare syndromes	2	5	1	8
10	PKU	--	--	--	--
11	other metabolic disorders	--	1	--	1
12	speech/language delay	4	5	4	13
13	behaviour disorders	--	3	--	3
14	hearing impaired	1	--	1	2
15	vision impaired	3	2	1	6
16,26	cerebral palsy/ neuromotor disorders	5	4	2	11
17	spina bifida	1	--	--	1
18	muscular dystrophy	--	--	--	--
19	other physical disabilities	2	1	4	7
20	fetal alcohol syndrome	3	2	--	5
21	maternal drug abuse	--	--	--	--
22	autism	--	--	--	--
23	seizures	--	--	4	4
28	frequent illness/ hospitalization	2	1	1	4
25	attention deficit disorders	--	--	1	1
24,27	unknown/other	2	1	2	5

Table 25

Summary of Degrees of Developmental Delay and Changes in Rates of Development by Assessment Groups

Group	n	Mean PCI	Mean CA	Mean DA	Months Delayed	DA/CA
2 or more assessments	486					
baseline (.75)		(1.00)	28.9	21.8	7.1	.754
2nd assessment		1.6	35.5	27.8	7.7	.783
3 or more assessments	322					
baseline (.73)		(1.00)	26.7	19.5	7.2	.730
2nd assessment		1.5	33.3	25.1	8.2	.754
3rd assessment		1.3	40.0	30.5	9.5	.763
4 or more assessments	186					
baseline (.72)		(1.00)	24.7	17.7	7.0	.716
2nd assessment		1.5	31.1	22.9	8.2	.736
3rd assessment		1.2	37.9	28.1	9.8	.741
4th assessment		1.1	46.0	33.2	12.8	.722
5 or more assessments	116					
baseline (.72)		(1.00)	21.4	14.9	6.5	.696
2nd assessment		1.5	27.7	20.2	7.5	.729
3rd assessment		1.3	33.8	24.8	9.0	.733
4th assessment		1.0	40.5	29.4	11.1	.726
5th assessment		1.3	47.0	34.8	12.2	.740
6 or more assessments	68					
baseline (.75)		(1.00)	18.7	13.6	5.1	.727
2nd assessment		1.4	24.8	18.9	5.9	.762
3rd assessment		1.3	31.0	23.5	7.5	.758
4th assessment		1.0	37.7	28.3	9.4	.750
5th assessment		1.4	44.0	33.7	10.3	.766
6th assessment		1.2	50.9	39.5	11.4	.776

Table 26

Summary of Degrees of Developmental Delay and Changes in Rates of Development by Disability Categories

Group	n	Mean PCI	Mean CA	Mean DA	Months Delayed	DA/CA
All Groups						
baseline (.75)	700	(1.00)	30.2	22.7	7.5	.752
2 or more assessments	486	1.6	35.5	27.8	7.7	.783
3 or more assessments	322	1.3	40.1	30.5	9.6	.761
4 or more assessments	187	1.1	47.2	34.3	12.9	.727
5 or more assessments	118	1.2	48.8	35.5	13.3	.728
6 or more assessments	68	1.2	50.9	39.5	11.4	.776
1,2 "Developmental Delay"						
baseline (.74)	385	(1.00)	30.8	23.1	7.7	.750
2 or more assessments	269	1.7	36.2	27.9	8.3	.771
3 or more assessments	188	1.3	40.9	30.6	10.3	.748
4 or more assessments	109	1.2	45.8	33.9	11.8	.740
5 or more assessments	70	1.2	48.3	36.3	12.0	.751
6 or more assessments	43	1.2	51.5	40.7	10.8	.790
12 "Speech/Language Delay"						
baseline (.82)	199	(1.00)	40.2	33.1	7.1	.823
2 or more assessments	144	1.9	45.7	40.0	5.7	.875
3 or more assessments	88	1.6	51.2	44.2	7.0	.863
4 or more assessments	43	1.3	52.9	44.1	8.8	.834
5 or more assessments	22	1.6	55.1	47.9	7.2	.869
6 or more assessments	13	1.6	59.6	54.4	5.2	.913
16,26 "Cerebral Palsy"/Neuromotor Disorders						
baseline (.51)	95	(1.00)	25.5	13.2	12.3	.518
2 or more assessments	71	1.6	32.4	18.9	13.5	.583
3 or more assessments	51	1.2	37.6	21.2	16.4	.564
4 or more assessments	36	1.2	44.6	26.7	17.9	.599
5 or more assessments	22	1.2	49.0	28.1	20.9	.574
6 or more assessments	10	1.1	52.2	36.0	16.2	.690
4 "At Risk, Environmental"						
baseline (.80)	79	(1.00)	30.1	24.0	6.1	.797
2 or more assessments	55	1.7	34.0	28.2	5.8	.829
3 or more assessments	37	1.2	41.2	32.0	9.2	.777
4 or more assessments	26	1.3	53.7	35.2	18.5	.656
5 or more assessments	14	1.6	48.9	38.6	10.3	.789
6 or more assessments	8	1.3	47.5	43.0	4.5	.905

Table 26 Continued

8	"Down Syndrome"					
	baseline (.83)	63	(1.00)	18.6	13.8	4.8	.742
	2 or more assessments	55	1.1	23.6	16.4	7.2	.695
	3 or more assessments	47	1.0	29.0	20.5	8.5	.707
	4 or more assessments	27	.9	47.2	33.2	14.0	.703
	5 or more assessments	21	.8	52.0	33.4	18.6	.642
	6 or more assessments	14	.5	46.0	29.7	16.3	.646
16	"Cerebral Palsy"					
	baseline (.47)	72	(1.00)	26.5	12.9	13.6	.487
	2 or more assessments	51	1.5	33.2	18.1	15.1	.545
	3 or more assessments	37	1.2	40.1	21.4	18.7	.534
	4 or more assessments	26	1.2	46.6	26.8	19.8	.575
	5 or more assessments	14	1.3	51.0	24.6	26.4	.482
	6 or more assessments	4	.9	50.0	29.9	20.1	.598
26	"Neuromotor Disorders"					
	baseline (.57)	26	(1.00)	22.6	13.5	9.1	.597
	2 or more assessments	23	1.8	31.2	19.5	11.7	.625
	3 or more assessments	17	1.1	33.7	19.2	14.5	.570
	4 or more assessments	13	1.1	42.6	23.1	19.5	.542
	5 or more assessments	10	.9	47.5	30.4	17.1	.640
	6 or more assessments	7	1.4	53.6	38.7	14.9	.722

Table 27

Group Changes in Rates of Development While in Intervention with DA/CA Ratio Compared to Baseline PCI unit and Baseline DA/CA

n	Assessment groups	Increase in CA (in months)	Increase in DA (in months)	Baseline	(baseline) DA/CA	(increase) DA/CA
486	2 or more	6.62	5.57	.75	.754	.841
322	3 or more	11.14	11.02	.73	.730	.982
186	4 or more	18.28	14.80	.72	.716	.810
116	5 or more	19.90	16.02	.72	.696	.805
68	6 or more	22.01	19.99	.75	.727	.908